



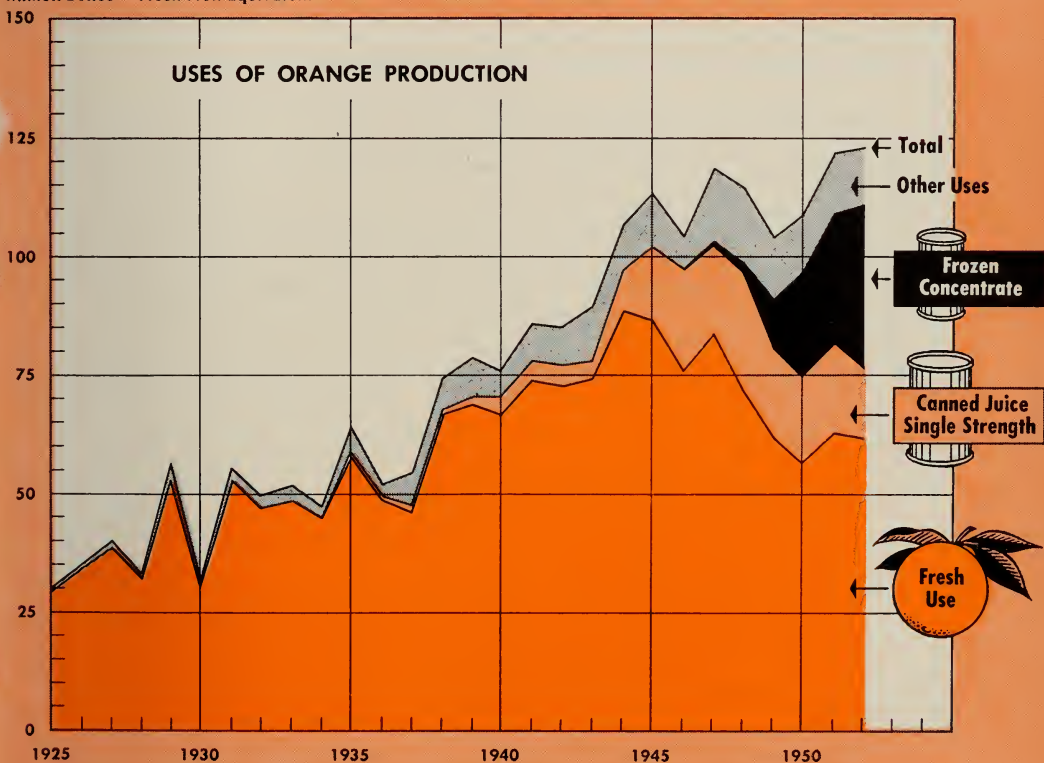
Oranges and Orange Products



CHANGING ECONOMIC RELATIONSHIPS

SIDNEY HOOS and J. N. BOLES

Million Boxes — Fresh Fruit Equivalent



THE ORANGE INDUSTRIES, since the end of World War II, have experienced marked changes. Those changes may be leading the industries into a new era. Those changes, also, raise many questions in the minds of producers, processors, distributors, and consumers. Will recent and current trends in the level of production, its geographical distribution, and its utilization continue? What does the future hold for the fresh-shipping industries compared with orange products? What are the problems and potentials facing the orange industries?

This bulletin discusses the above and related questions in light of changing economic relationships and the changing marketing scene. Its purpose is to provide economic and marketing information helpful in appraisal of the current situation and outlook for the orange industries.

THE AUTHORS:

Sidney Hoos is Professor of Agricultural Economics and Economist in the Experiment Station and on the Giannini Foundation.

J. N. Boles is Assistant Specialist in the Experiment Station and on the Giannini Foundation.

CONTENTS

INTRODUCTION	4
SUMMARY	5
REVIEW OF ECONOMIC TRENDS	11
Production	11
Acreage	16
Yield	19
Relations between Acreage, Yield, and Production	19
Utilization	21
Fresh Shipments	26
Orange Exports	28
Costs, Cultural and Marketing	29
Returns, Fresh and Processed	30
DEMAND CHARACTERISTICS OF ORANGES AND ORANGE PRODUCTS	35
What is "Demand"?	35
Seasonal f.o.b. Demand for California Fresh Oranges	37
Winter Oranges	37
Summer Oranges	40
Consumer Demands for Oranges and Orange Products	41
Consumer Uses of Oranges and Orange Juice Products	46
CHANGING ECONOMIC RELATIONSHIPS	49
Major Shifts in Production-Marketing	49
Frozen Concentrated Orange Juice	49
Canned Single-Strength Orange Juice	51
Hot Concentrate	52
Changing Attitudes of Consumers	52
Production for Fresh Shipment and Processing	54
California Fresh Shipment Prorate	57
Problems and Potentials	62

ORANGES AND ORANGE PRODUCTS

Changing Economic Relationships*

SIDNEY HOOS and J. N. BOLES

INTRODUCTION

The orange industries in California have long been an important part of the state's economy. Until the recent upsurge in cotton acreage and production in California, oranges for many years were the leading agricultural crop in the state. And even now, after the many postwar changes which have occurred in California's agricultural and general economy, the orange industries are a major contributor to the state's agricultural wealth and income.

Orange production and marketing developments in the postwar years, and effects of changing economic relationships, have directed new attention to the economic status of the orange industries. Interregional competition and interproduct competition have magnified old problems and introduced new problems and potentials.

The present is an opportune time to review and appraise the course of economic developments in the orange industries. The blush of early and spectacular success in the growing of oranges for use in frozen concentrated juice has begun to fade. The outlook for the future of the orange industries in California, Florida, and other producing areas is not as clear as some believed a short time ago. To appraise the current situation, and have a basis for considering the potentials for the future, this bulletin presents an analy-

sis of the changing economic relationships and their impacts on the orange industries.†

The third section of this report, to provide necessary background information, reviews the more significant economic trends in the orange industries. It deals with the different trends in the major producing areas. It considers acreage, yield, production, utilization, shipments, prices, costs, and returns. This section tells *what* has happened.

The fourth section of the report is concerned with the nature of the demands for oranges and orange products. Attention is given to the demand characteristics for winter and summer fresh oranges and how those characteristics have tended to change over time. Competitive consumer demands for fresh oranges, canned single-strength orange juice, and frozen concentrated orange juice are considered. These demand characteristics and relationships also reflect what has happened; but they provide some information necessary to understand *why* various developments have occurred—and to weigh their effects.

The fifth and final section of the report is titled "Changing Economic Relationships." It discusses the effects of technological developments in processing orange products and their marketing alongside fresh oranges. Earning levels of California and Florida growers are ex-

* Paper No. 130. The Giannini Foundation of Agricultural Economics.

† For a comparable analysis of the changing economic relationships in the lemon industries see Exp. Sta. Bul. 729, *Lemons and Lemon Products*; *Changing Economic Relationships, 1951-52*, by Sidney Hoos and R. E. Seltzer.

amed in light of the changing market relationships, and the role and operations of the California fresh orange shipment prorata are reviewed. The report closes by setting forth significant problems and

potentials facing the orange industries in California as they adjust to and take advantage of changing economic relationships. The "Summary" indicates the highlights of sections mentioned above.

SUMMARY

During the period between the two world wars, the annual orange production of the United States more than doubled. During World War II and since then, production continued to increase. Three decades ago, the United States accounted for about 30 per cent of the world's orange production. Now this country accounts for 40 per cent.

The growth in national production of oranges, especially in Florida in recent years, has been reflected by the increasing pressure of orange supplies. This pressure induced the search for new markets and outlets. In the 1930's, the fresh orange market, long the only channel from orange producer to consumer, was supplemented by canned single-strength orange juice. This introduced the outlet for orange-juice products. Although the canned single-strength orange juice market expanded, the product did not attain the position of a close substitute for juice from fresh oranges. The pressure of orange supplies continued and, not long after the end of World War II, frozen concentrated orange juice was introduced. This new product could be manufactured as a close substitute for juice squeezed from fresh oranges and gained consumer acceptance quickly. The market for frozen concentrate expanded tremendously. These developments left marked impacts on the orange industries; these impacts differ in Florida and in California, and they also differ for California Valencias and for California navels.

In Florida, where frozen concentrate was first manufactured, orange growers for several years benefited greatly from competition for the fruit among proces-

sors and between processors and fresh shippers. Greatly increased returns accrued to Florida growers, and further plantings were induced. The pressure of increasing crops and the accumulation of inventories of orange juice products, however, resulted in much lower returns to Florida growers by early 1952.

In California, where the fresh shipment market has been and still is the mainstay, frozen concentrate was not manufactured in significant volume until 1949-50. It still is at a much smaller volume than in Florida. The growth in orange juice products, especially frozen concentrate, has faced the California grower and fresh shipper with competition from a close substitute. This applies more to California Valencias than to California navels. Returns to California growers have been affected. These changing economic relationships, related to technological developments, are having repercussions on marketing institutions and practices. In the meantime, the national production and consumption of oranges, in terms of fresh and total products, have reached higher levels than ever before. The following pages set forth what has happened and why, revealing the crosscurrents of developments in both the fresh and juice-products markets.

Orange production in the United States has not grown at the same rate in the various producing areas. During the past thirty years, production of oranges has increased in each of the major areas, but the increase has been neither steady nor proportional. A marked shift has occurred. During the 1920's, California's share of national production averaged near 60 per cent and Florida's share av-

eraged near 35 per cent. Now, in percentage terms, the positions of California and Florida have just about reversed as a result of developments over the past three decades. When only the past decade is considered, there has been a downward trend in California-Arizona orange production, but the trend continued up in Florida.

In the California-Arizona area, trends in orange production have varied among the several districts. The production trends have declined in recent years in all of the districts in the area. Southern California, the largest district, has expanded its proportion from 75 to 85 per cent of the area total. The increase was largely at the expense of the central-northern California district.

As total production trends in recent years have differed in California and Florida, so have the varietal production trends varied within each state. Since 1934, more than 55 per cent of the California orange crop has been Valencias, the remainder being navels and miscellaneous. The Valencia proportion has increased during the past two decades; the current percentages are near 65 per cent Valencias and 35 per cent navels and miscellaneous varieties (hereafter referred to only as navels).

Since 1943-44, the central-northern California district's proportion of Valencias in the annual crop has declined from 35 to about 25 per cent; navels increased from 65 to 75 per cent. In the central-northern district of California, not only has total production dropped since 1943, but Valencias have lost ground to navels.

In the southern California district, Valencias have been the dominant variety, constituting about two-thirds of the annual output. In recent years, Valencias have continued their percentage increase—if only slightly. In the Arizona-Desert Valley district, however, the proportion has been more evenly divided, although in the past several years navels have tended to make up the larger proportion.

The freezes in some of the recent years in California have reflected on the variety proportions. But over the past dozen or fifteen years, the state's increased percentage of Valencia production resulted from the situation in southern California, whose relatively large volume tends to dominate the state's picture. In both the central-northern and Arizona-Desert Valley districts, Valencias had given way to navels.

The Valencia orange attained greater relative volume in Florida during the past fifteen years. Valencias amounted to over 30 per cent in 1934-35, rose to a peak near 50 per cent in the middle 1940's and now are near 45 per cent. Early and midseason varieties presently make up about 55 per cent of the Florida orange crop.

These production and variety trends have resulted from the interaction of the trends in yield and bearing acreage.

The upward trend in California orange production until the middle 1940's reflected rising trends in both yield and bearing acreage. The sharp rise in California production from 1939 until 1944 was due primarily to unusually high yields, and the downward drift of California production after the peak 1944 was due to both decreased yields and acreage.

The increase in Florida orange production until the middle 1930's reflected increased bearing acreage offsetting decreasing and then stable yields. But in the past fifteen years, both increased acreage and higher yields contributed to the strong expansion in Florida production; the higher level of yield, however, was the more influential.

Review of the record shows that bearing acreage in Florida rose more sharply than in California and, in recent years, yields in Florida advanced more than in California. This greater increase in both acreage and yields account for Florida's orange production surpassing that of California.

The increased volume of national production in the past two decades induced changes in utilization. Only fifteen years ago, over 90 per cent of the nation's orange crop was used in fresh form, but now only about half is so used. Frozen concentrate grew at a tremendous rate; it now takes nearly 30 per cent of the orange production, and further increases are indicated. This marked growth in orange products temporarily solved—for some groups—the problem of pressing supplies growing faster than demand; but new problems—for other groups—were created.

The country at large now consumes more oranges—when all forms are included—than ever before. This increased consumption includes the marked increase in orange products. As the processed-orange outlet expanded, California's participation was not as marked as Florida's. A declining proportion of the total oranges processed was from California fruit. But even in this state, an increasing portion of the crop has been processed, especially during the past several years.

The California Valencia orange is more adaptable for processing than is the navel. In 1950-51, as much as 43 per cent of the California Valencia crop was processed and only 12 per cent of the navels. This compares with over 50 per cent of the Valencias, and early and mid-season varieties, processed in Florida in 1950-51.

The growing and spectacular segment of the orange-products market in the past several years has been frozen concentrate. Frozen-concentrate output began earlier in Florida where the pressing supply had been growing rapidly. In California a significant volume has been manufactured only in the past two years. These changes in utilization of the orange crop are significant; they reflect consumer preferences and affect grower returns.

Cultural costs in the production of oranges have long been lower for Florida

growers than for California growers. Florida's cost advantage has become even more marked within the past decade. This widening cost differential resulted from the combined effects of higher yields in Florida and a greater rise in cultural costs for California growers. When marketing costs are added to cultural costs, we find that total costs during the past decade have risen for California and Florida, but the rise has been substantially larger for California growers.

California fresh oranges have generally sold for higher prices per packed box (and still higher per pound) than Florida fresh oranges. This premium differential California shippers received for their fresh oranges was sufficient so that even on an f.o.b. basis California oranges have returned higher per-box prices than Florida oranges.

On-tree returns give a picture closer to the grower. Generally—with some exceptions, as in 1949-50—the on-tree per-box value of California oranges shipped for fresh use (Valencias and navels combined) exceeded the on-tree per-box value of Florida oranges either shipped for fresh use or for processing. When processing alone is considered, the on-tree return to the California grower has been much lower than to the Florida grower. But after 1947-48 the on-tree returns—fresh and processed—in Florida advanced sharply, reflecting the impact of packers' demand for oranges to be manufactured into frozen concentrate. And in 1950-51, for the first time on record, Florida on-tree per-box returns from both fresh and processed uses exceeded California on-tree returns from oranges shipped fresh.

Within California, on-tree per-box returns from oranges shipped fresh exceed by a substantial amount those from oranges processed. This is true for both Valencias and navels. But until recent years the on-tree returns from Valencias used fresh averaged higher than for navels used fresh. During the past several

years this situation has been reversed. When California oranges go to processing, Valencias yield greater on-tree returns than do navels; and this processing differential in favor of Valencias widened much during the recent postwar years.

A picture even closer to the grower is obtained when "net returns" are considered. Such returns are not really net because neither orchard depreciation nor interest on orchard investment is reflected in the estimates. During the years prior to World War II, California net returns generally compared very favorably with those in Florida; and during those years California Valencias yielded better net returns—dollars per box—than did California navels. In the postwar years, the situation has been different; Florida growers have experienced—on the average—much better returns than California growers. And California navels yielded better returns than California Valencias. These changes in returns reflect the interaction of the changing supplies of oranges and orange products and changing consumer demands.

The demand for California fresh oranges involves the demands for winter oranges (mostly navels) and for summer oranges (mostly Valencias). First consider winter oranges. The season average f.o.b. price of California fresh winter oranges is determined primarily by the interaction of California-Arizona fresh shipments, fresh shipments from other producing areas, the level of national income, and a trend reflecting changes over time. For given levels of income, of supplies from other areas, and of consumer attitudes, an increase in the shipment and sale of California-Arizona fresh winter oranges is associated with a decrease in the f.o.b. price. Increased winter shipments from other areas also tend to depress the f.o.b. price of California-Arizona fresh oranges. Increased levels of national income, with other factors equal, tend to increase the demand for fresh winter oranges.

In recent years there was an apparent tendency for the demand for California-Arizona fresh winter shipments to taper off and perhaps even enter a declining phase. But the demand situation now appears to differ from the prewar years in another important way. In the recent postwar years and now, the sales volume of California-Arizona fresh winter oranges is more responsive to price changes than it was before the war. The reason seems to be that more acceptable substitutes or alternatives (orange products) for fresh oranges are now available.

Now consider fresh summer oranges. The season average price of California summer fresh oranges is also determined primarily by the level of California-Arizona fresh shipments, fresh shipments from other producing areas, the level of national income, and a trend reflecting changes in demand over time. Increased shipments from California-Arizona, and also those from other areas tend to depress the f.o.b. price of California fresh summer oranges. Increases in national income tend to raise the demand for summer oranges. And the demand for California-Arizona fresh summer oranges, as for winter oranges, appears to have tapered off during recent years. The sales volume of fresh summer oranges, too, is more responsive to price changes now than before the war. Here, also, the change appears to reflect the impact of competition from orange juice products.

The evidence suggests that there exists a competitive demand relation between fresh oranges and orange juice products; and it also appears that the recent developments in frozen concentrated orange juice have had a much greater impact on the fresh orange markets than did the earlier developments in canned single-strength orange juice. The current competitive demand relation between fresh oranges and orange-juice products does not reflect a new situation. But the competition is much stronger than previously

and the timing within the year is now different.

The better packs of frozen orange juice concentrate very closely approximate—in taste, flavor, and body—juice squeezed from fresh oranges; much more so than canned single-strength orange juice. The storability of the frozen concentrate permits its sale to consumers over the year. Thus, a highly acceptable substitute for juice squeezed from fresh oranges is available year round; and California Valencias now do not have the seasonal advantage they used to have when Florida fresh oranges were at their seasonal low. Florida oranges, in the form of frozen concentrate, have also attained a wider geographical market; for example, high volume sales the year round are now made in the Pacific Coast states. These changes in the marketing and the geographical distribution of a large part of the Florida crop—that part put into frozen concentrate—is one of the significant changing economic relationships in the orange industries.

A change in the timing of the marketing of part of the Florida crop is not entirely new; it occurred with the introduction and growth of canned single-strength juice. But that product did not have the consumer acceptability of frozen concentrate. The spectacular growth in the distribution and consumption of frozen orange juice concentrate results from a mixture of several influences. The product is a close substitute of fresh juice; the consumer price has tended downward; use of the product is convenient for many householders; a high and rising national income has existed; and the distribution system was ready-made in the form of low-temperature cabinets widely available in retail outlets. In short, the product has been attractive to the consumer in quality, price, convenience; and it has been widely available to him.

The evidence suggests that the growth of frozen concentrate has had a greater

impact on California Valencias than on California navels. Navels generally, not entirely, are used by consumers for eating “out of hand,” in salads, or in various forms other than squeezing for juice. Thus, navels have not been faced with a competitive product as much as Valencias. In addition, navels have long been accustomed to competition from fresh oranges from other areas; but for Valencias, frozen concentrate appeared as a type of competition which had not prevailed earlier.

Thus, the development of frozen concentrate has had serious repercussions on the California orange industries, especially California Valencias. In Florida where much of the orange crop in recent years has gone into the manufacture of orange concentrate, some old problems were solved, but only temporarily, and new problems were created.

Orange growers, shippers, and processors, especially in Florida, several years ago, believed that frozen concentrate would solve the problems of the citrus industries. They now face the price-depressing effects of increased crops and of inventories of frozen concentrate. The record high prices received by Florida growers in recent years, caused in large part by the competition among processors for making frozen concentrate, induced further plantings and expansion of the orange-producing industry in that state.

The pressure of supply growing faster than demand had its effect on Florida growers in 1951–52. Inventories of frozen concentrate had accumulated in the face of even more oranges available for picking, and the reaction has been lower prices to growers in Florida. Their returns, which were phenomenally high only two years ago, in 1951–52 declined to a much lower level.

This does not mean that frozen concentrate is on the way out. It does mean that its success in some ways has brought with it problems in other ways. It means that another major market outlet for

oranges has been established, but that this new outlet will not displace entirely the earlier outlets. It means that a larger proportion of the orange crop is being marketed in the form of a manufactured product where nonprice as well as price competition is important. It means that aggressive competition and merchandising on the parts of each of the segments of the orange industries—fresh shipments, frozen concentrate, canned single-strength orange juice—will be necessary to hold or to increase their relative volumes. It means that the orange industries are subject to the impacts of technological and marketing developments and the changing economic relationships which follow them as well as precede them. As frozen concentrate has come on the scene and is leaving its mark, so other types of orange products may be developed. Among them may be a nonfrozen concentrate, acceptable in quality and price, which needs no refrigeration but has the taste and nutrition characteristics of juice squeezed from fresh oranges. New varieties and/or stock scion combinations may be employed which produce oranges best adapted for use other than manufacturing juice and which are more acceptable in taste, convenience, and yield than the present varieties of oranges. These are potentials which face the orange industries.

The developments in the orange products markets have introduced other potentials as well as problems. The views of many California-Arizona orange growers, especially of Valencias, led to questioning the effectiveness of the California-Arizona order which regulated by volume of shipment the handling of oranges grown in California and Arizona. Some favored its elimination, others its modification, still others its continuation as it stood. After a grower referendum, the order was terminated effective March 8, 1952. In the discussion of the order and its effectiveness, a clear distinction had not always been made between what the

Orange Administrative Committee could do and what it could not do; between what it was established to do and what some groups believe it should have done; between the interests of the orange industries as a whole and the interests of various segments within the orange industries. The evidence suggests that at times the Orange Administrative Committee, in its operation of the Volume Prorate, had been charged with the responsibility for the outcome of developments over which it had no control. This is not to say that various questions cannot be raised in connection with the operation of the Volume Prorate; it is to say that the major part of recent price and income disappointments came about for reasons basically unrelated to the operations of the Orange Administrative Committee.

Under present conditions, and those likely to be with us for some time, the interdependence among the markets for fresh oranges and orange products is such that operations in one affect the returns from the other. If the financial interests of all growers were merged, the ideal use of the orange crop would be consistent with obtaining the largest net profit from the entire crop. But all growers do not have identical interests. Changing economic relationships, however, are now shaping the situation such that significant industry decisions are being called for. The orange industries of California, and Florida too, now face the problem whether such decisions are to reflect organized group thinking and interests under the jurisdiction of appropriate federal and state authorities, or, whether the outcome is to reflect the independent interests and actions of individual growers, shippers, and processors.

But with or without formalized group-marketing schemes, the growing supply pressure of oranges and orange products interacting with the competitive demand relations now obliges greater attention than ever toward possibilities of increas-

ing yield per resource inputs and decreasing costs per volume outputs. Among such potentials facing California growers is the rationalization of packing-house organization and operations. The elimination of certain packing houses or their consolidation with other houses, along with modifications in internal operations and a reconsideration of the flow of fruit from orchard to packing house or processing plant, may reduce unit costs and at the same time bring the productive

services of the industry in line with current developments.

The pressure for cost reductions follows from the need for increasing returns to large segments of the California orange industries. The earnings from use of the land and other resources in the production of oranges, and how they compare with expected earnings from alternative uses of those resources, determine the course of the California orange industries.

REVIEW OF ECONOMIC TRENDS

In order to provide an adequate working background and set forth some of the more important developments in the orange industry, we now investigate some economic trends. The objective in this part is to show *what* has happened. Later on we shall interpret what has happened and look into the apparent results and effects of the developments.

First we shall review the trends in production not only in California but also in other major producing areas. Next, we shall consider the production influences of bearing acreage and yield. Third, we shall discuss the trends in utilization—fresh oranges, canned single-strength orange juice, and frozen concentrate orange juice. Finally, we shall consider costs and returns from the grower's viewpoint. These phases will provide the background for a discussion of the demands for oranges and orange products and how such demands have changed in recent years.

Production. During the period between the two world wars, the annual orange production of the United States more than doubled, just about keeping pace with the increase in world production (fig. 1). Average annual production of oranges during the first half of the 1920's was slightly over 31 million boxes, or about 31 per cent of total world production; in the latter half of the 1930's orange production averaged 67 million boxes annually, also about 31 per cent of

total world production. During World War II, United States production continued to increase while the production of many of the other countries remained fairly constant or decreased. As a result, for the 1949-50 season United States production of over 108 million boxes amounted to 40 per cent of the world total.

The extent to which orange production in this country has increased in recent years is also well emphasized by comparing the increase in oranges with what has occurred in other fruits.

The figures in the table on page 13 clearly show that the production of all citrus fruits, not only oranges, has expanded much more than other fruits. This large increase in citrus production has been associated with expanded consumption, but price repercussions have also occurred.

Orange production in the United States has not risen at the same rate in the major producing areas. The differing trends are shown in figure 2 for California, Florida, and the country as a whole. The two major orange-producing areas in the United States are California and Florida. Only relatively small amounts are produced in Texas, Arizona, Alabama, Louisiana, and Mississippi. During the past thirty years, production of oranges has increased in each of the major areas, but the increase has been neither steady nor proportional. In the

Figure 1. Production of Oranges, Tangerines, and Mandarins, World and United States, from 1920/21.

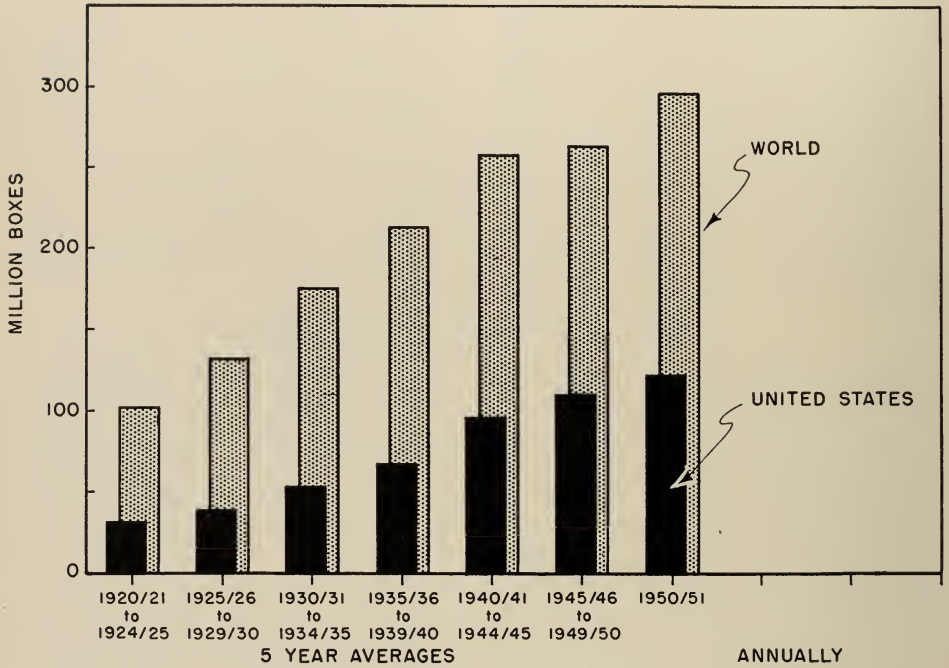
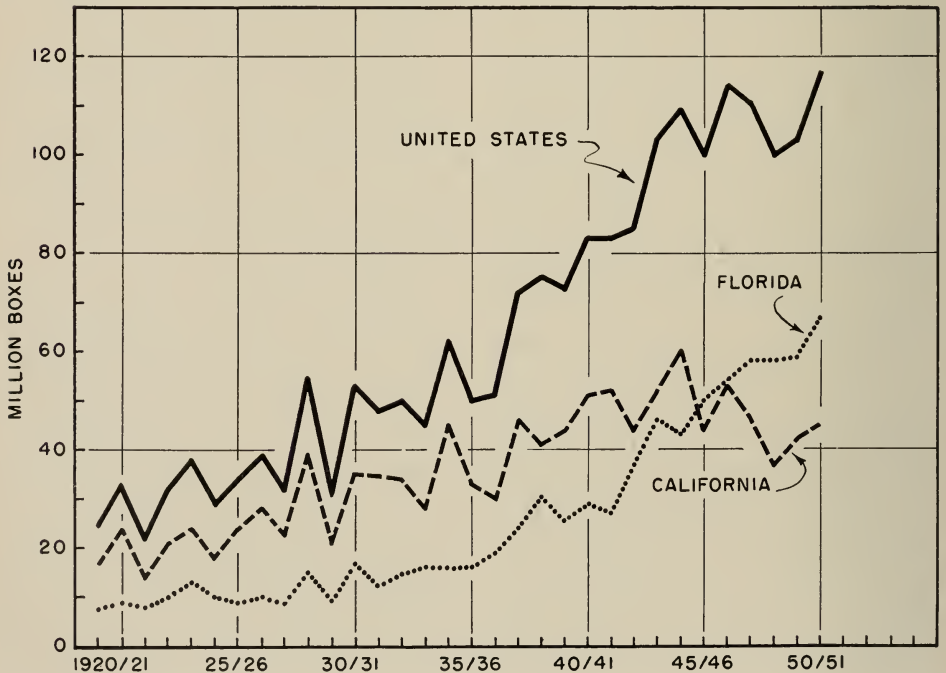


Figure 2. Orange Production in United States, California, and Florida, from 1919/20.



U. S. Production of Oranges and Other Fruits

Fruits	Production Units	U. S. production in 1925-30 and 1945-50		
		Average 1925-30	Average 1945-50	Percentage change
Apples	1,000 bushels	161,200	107,420	per cent - 33
Bananas, imports	1,000 bunches	60,437	53,366	- 12
Cantaloupes	1,000 crates	13,850	12,440	- 10
Grapes	1,000 tons	2,396	2,896	+ 21
Grapefruit	1,000 boxes	11,728	52,170	+335
Lemons	1,000 boxes	6,880	12,580	+ 83
Oranges	1,000 boxes	41,705	111,210	+167
Peaches	1,000 bushels	54,270	74,020	+ 36
Pears	1,000 bushels	22,720	32,780	+ 44
Plums and prunes	1,000 tons	687	666	- 3

season of 1919-20 California production was about 16.6 million boxes. Since then, California orange production followed a persistent upward trend until the middle 1940's. After the all-time peak in 1944-45, California production receded, and now is about at the level of ten years earlier.

Florida's production in 1919-20 was less than 8 million boxes. The trend was slightly upward until 1935-36. Then a series of increased crops brought the state's output to a much higher level. After 1940-41 and during the war years, Florida's production increased sharply, and the high-level record outputs were maintained the past several years. Up to the middle 1940's, California's volume of orange production exceeded Florida's; but beginning with 1945-46, Florida established and has maintained her position of the leading orange-producing state by volume.

Another way of looking at the shift is to consider the proportionate output by states. California's share in total United States orange production during the 1920's varied from year to year but averaged over 60 per cent. Since Florida's production increased at a more rapid

rate, California's share decreased, reaching a low of 37 per cent in 1948-49 and rising to 39 per cent in 1950-51. Hence the positions of California and Florida have just about reversed over the past three decades.

Within California-Arizona the trends in orange production have varied between the various districts which include the orange-producing areas in the two states. The districts were outlined by the Orange Administrative Committee for its use in regulation of the shipments of fresh oranges.*

California-Arizona was divided into four shipping or prorate districts—northern California, central California, southern California, and Arizona-Desert Valley. The central and northern California districts were a single district until December, 1950; hence, the trends will be reviewed for the combined central-northern California area.

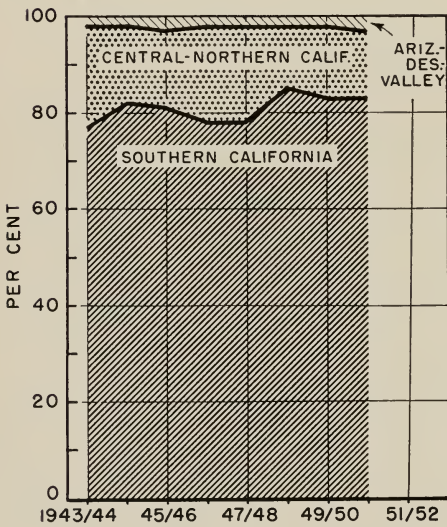
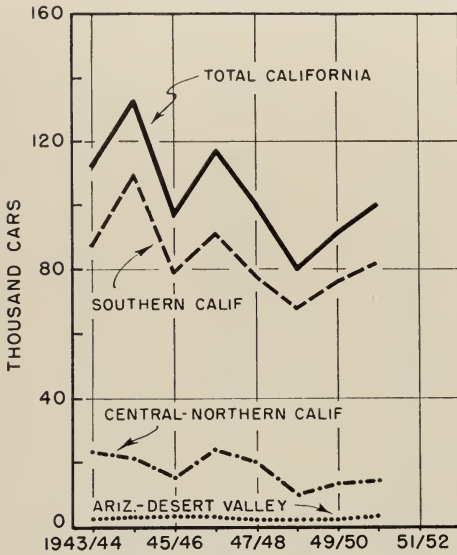
In geographical terms, the districts are specified as follows:

District 1: North of a line east and west through the Tehachapi Mountains, excluding district number 4.

District 2: South of a line east and west through the Tehachapi Moun-

* The Orange Administrative Committee and its operations are discussed on page 57.

Figure 3. Orange Production in California, by Districts, from 1943/44.



tains excluding Imperial County and that part of Riverside County east of San Jacinto Peak.

District 3: Arizona, Imperial County, and Riverside County east of San Jacinto Peak.

District 4: North of 37th parallel.

The southern California district produces by far the largest amount (see fig. 3) of the total California-Arizona orange crop, averaging more than 80 per cent the past few years. Central-northern California is the next largest district, producing an average of about 17 per cent. The Arizona-Desert Valley district provides only about 2 per cent.

The production trends have declined in recent years in all of the districts in California* except the Arizona-Desert Valley district. This situation may be summarized by noting that, since 1943-44, orange production in the combined central-northern California districts declined from over 23,000 cars to a little less than 14,000 cars last year; in southern California, from over 108,000 cars in 1944-45 to over 82,000 cars; and in the Arizona-Desert Valley district, increased from about 2,700 cars in 1945-46 to a little more than 3,200 cars (see fig. 3). Therefore, since 1943, this last district has increased its proportion of the state's total production. Southern California has expanded its proportion from slightly over 75 per cent to almost 83 per cent, largely at the expense of the central-northern California district whose proportion declined about correspondingly.

Orange production in California and Florida is composed of two major varietal groupings. In California the two groups are: (1) Valencias and (2) navels and miscellaneous, generally and hereafter referred to only as navels. In Florida the groupings are: (1) Valencias and (2) early and midseason. Therefore, we must look at the varietal production trends in the two states.

As the total production trends in recent years differed in California and Florida, so have the varietal production trends varied within each state. In California, during every season since 1934-35, more

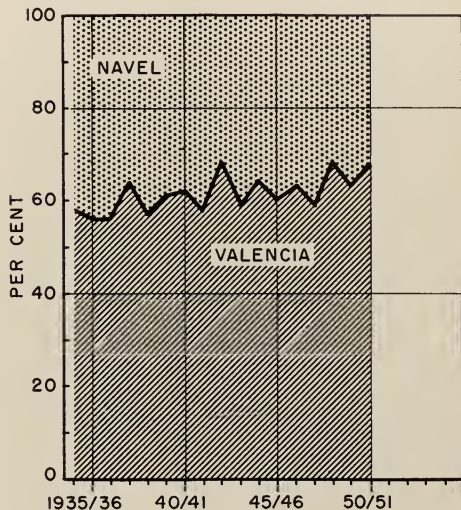
* To simplify the wording the California-Arizona orange-producing area is often referred to as California. This practice is followed here and generally in the subsequent pages.

than 55 per cent of the total orange crop has been Valencias, the remainder being navels. The change has been erratic and gradual, but there was an increase in this percentage to a peak of 68 per cent in 1942-43 and again in 1948-49. The current percentages are probably near 65 per cent Valencias and 35 per cent navels (see fig. 4).

A somewhat similar increase in Valencias was experienced in Florida. Starting at a lower level of over 30 per cent Valencias in 1934-35, the percentage of the state crop which was Valencia oranges rose to a peak of 49 per cent in the middle 1940's and then receded to 43 per cent in 1949-50. The current Valencia percentage in Florida is probably near 45 per cent. The other category, "early and midseason" oranges, account for about 55 per cent of the Florida orange crop.

In view of the significantly different marketing characteristics of California navels and Valencias, and especially in view of the different impacts resulting from processed orange products, it is worth noting how the varietal production trends have varied by districts. Within the California orange-producing region, the three shipping districts produce different proportions of the two major varietal types, Valencias and navels.

Figure 4. Orange Production in California, Navels and Valencias by Per Cent, from 1934/35.



The central-northern California district's proportion of Valencias in the 1943-44 year was about 35 per cent, fluctuated thereafter and dropped to 17 per cent in 1948-49, the year with a freeze; by 1950-51 the Valencia proportion was back up to about 33 per cent. Valencia production in central-northern California was at a peak of 8,297 cars in 1943-44; and navels were at a peak of 16,643 cars in 1946-47. In this district total production has tended down, both in Valencias and navels.

California Orange Production, by Major Varieties and Districts

Crop year	Central-Northern California		Southern California		Arizona-Desert Valley	
	Valencia (cars)	Navel (cars)	Valencia (cars)	Navel (cars)	Valencia (cars)	Navel (cars)
1943-44	8,297	14,995	57,823	28,870	1,000	983
1944-45	6,253	15,104	76,228	32,378	1,416	1,076
1945-46	5,339	10,084	51,049	27,597	1,491	1,218
1946-47	7,043	16,643	65,562	25,066	1,367	1,262
1947-48	5,170	14,581	52,401	25,869	829	955
1948-49	1,803	8,476	51,411	16,912	616	963
1949-50	3,113	9,853	52,844	23,270	918	1,245
1950-51	4,638	9,250	60,944	21,539	1,851	1,351

In the southern California district, Valencias were the predominant variety constituting about two-thirds of the annual output. The largest production of both varieties occurred in 1944-45 with a crop of 76,228 cars of Valencias and 32,378 cars of navels. In this district Valencias in recent years have continued their percentage increase—if only slightly.

Production in the Arizona-Desert Valley has been more evenly divided. The proportion of Valencias dropped from a high of about 57 per cent in 1944-45 to a low of 39 per cent in 1948-49 and returned to 58 per cent in 1950-51. The peak-production year was 1950-51 for both varieties, 1,851 cars of Valencias and 1,351 cars of navels.

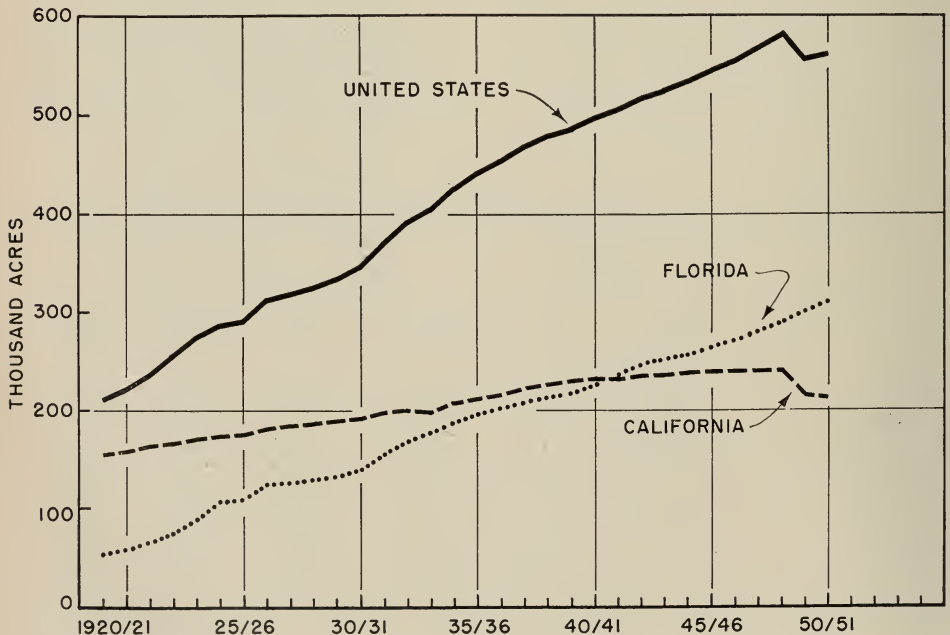
In viewing the district production trends by varieties, undue emphasis should not be given to the production levels or percentages during the past two or three years. The freezes experienced in some districts in those years resulted in abnormal situations. But it is clear that

over the past 10 or 15 years, the increased percentage of Valencia production resulted from the situation in southern California whose trends and relatively large volume dominated the state's picture. In both central-northern California and the Arizona-Desert Valley districts, Valencias have tended to give way to navels.

Acreage. The two factors which determine production are bearing acreage and yield per bearing acre. Therefore, to understand the production trends we must look at the trends in bearing acreage and yield.

Total United States orange-bearing acreage has risen steadily and sharply during the past thirty years from 212,300 acres in 1919-20 to a peak of 606,400 acres in 1948-49; then a decline was reported (see fig. 5). The reported sharp decrease of some 17,000 acres between 1948-49 and 1949-50 is the result of an uncommon combination of circumstances: a 20,000-acre increase in Florida bearing acreage; a decrease of about

Figure 5. Orange Bearing Acreage in the United States, California, and Florida from 1919/20.



13,000 acres in Texas due to the bad freeze in January, 1949; and a reported decrease of California's bearing acreage of some 23,000 acres. The California decrease was not due to cold weather but to a re-evaluation after a complete enumeration survey of California acreage which began in 1948 and was continued in 1949. Hence, the "decrease" in California was probably more in the nature of a statistical adjustment rather than a real downturn.

California bearing acreage since 1919-20 followed a steady upward trend and exceeded Florida until 1941-42. Florida orange-bearing acreage also followed an upward trend but increased even more rapidly. It expanded from 52,800 acres in 1919-20 to almost 310,000 acres in 1950-51. This increase of more than 250,000 acres was one of the outstanding developments in the industry. Thirty years ago, Florida's bearing acreage was only about one-third of California's, but now Florida's acreage is more than 45 per cent larger than California's. The bearing acreages of the other orange-producing states are much smaller than those of either Florida or California. Texas reached a peak of 40,500 acres in 1948-49 but receded to less than 30,000 acres with the freeze in January 1949. Then a freeze in February 1951 again affected Texas production. Arizona reached a maximum in 1949-50 with 8,300 acres. Only 4,500 bearing acres existed in all other states in 1949-50.

The net position of California's bearing acreage may be summarized by noting that in 1919-20 the state had almost 75 per cent of the country's total orange-bearing acreage, and by 1949-50 the share had declined to less than 40 per cent. Florida, in turn, increased its share from 25 per cent of the national bearing acreage in 1919-20 to 55 per cent in 1949-50.*

The available figures on nonbearing

acreage are not as comprehensive or detailed as for bearing acreage. But indications are that last year nonbearing acreage in Florida was over four times as large as that in California. Hence, there are some indications that Florida's bearing acreage will continue to expand, at least during the next several years, and more than in California.

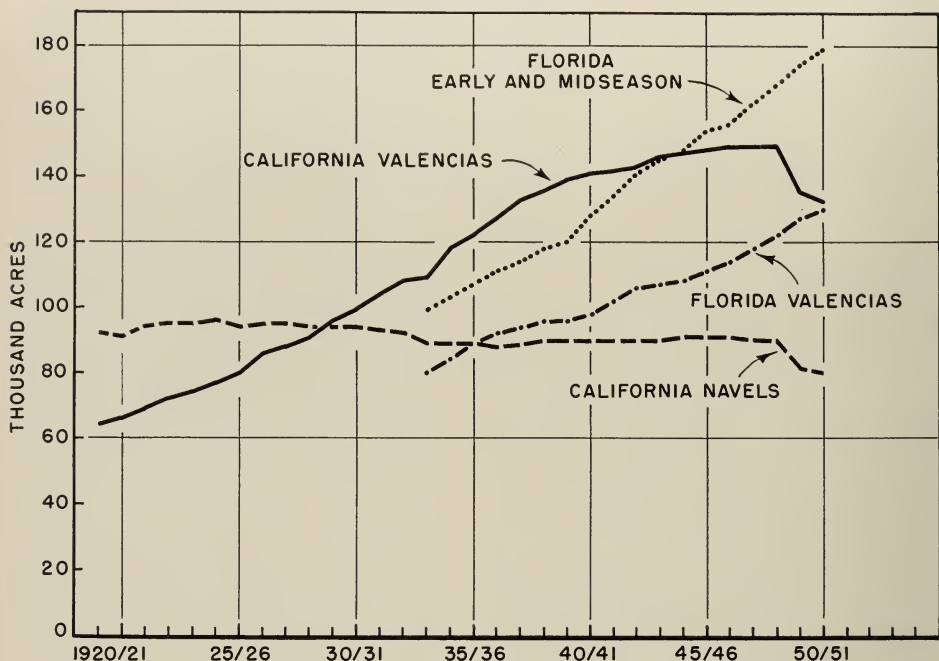
The bearing acreage trends in California and Florida have differed among the varieties. In California the bearing acreage of navels has remained remarkably stable during the past thirty years (see fig. 6). But California Valencia bearing acreage followed a rising trend. Hence, it is clear that the upward trend in California over-all bearing acreage was due to the upward trend in Valencias. Navels did not contribute to the state's increased number of orange-bearing acres. California Valencia bearing acreage over the past thirty years increased from 40 per cent to 63 per cent of the state's total orange-bearing acreage.

In Florida, for which adequate statistics on varietal bearing acreages are available only since 1933-34, the trends in both Valencias and early and mid-season have been rising steadily. After about 1940, the early- and midseason-bearing acreage generally advanced more rapidly than did the Valencias. But it is clear that in Florida both varietal groups have contributed to the rapidly expanding bearing acreage during the past fifteen years. Valencia acreage in Florida has declined in relative terms—from 45 per cent to 42 per cent of the state's total orange-bearing acreage.

Looking at acreage in California by counties, we find that in 1950 there were nine counties each of which had orange acreage exceeding 1,000 acres. Orange County, the smallest in terms of square miles, had the largest orange acreage, 60,109 acres, equal to 27 per cent of the state total. Arranged in order of acreage,

* For comparison of California and Florida acreage, it may be noted that Florida averages fewer trees per acre (65) than does California (88); although the Florida trees tend to be larger than those in California.

Figure 6. Orange Bearing Acreage in California and Florida, by Varieties, from 1919/20.



the other counties are Tulare, Los Angeles, and San Bernardino, each with more than 15 per cent of the state total; Ventura and Riverside each with more than 7 per cent of the state total; San Diego, Fresno, and Kern counties, with 3, 1, and 0.6 per cent of the state total.

For the past ten years the percentage distribution of orange acreage in the counties has not changed much. From 1940 to 1950, Tulare's share of the state total increased only 1 per cent; Los Angeles' share decreased 2 per cent; San Bernardino's decreased 1 per cent; and Ventura's increased 2 per cent.

Orange acreage in California is mainly grouped into two geographic regions. The larger comprises the coastal region composed principally of Orange, Los Angeles, San Bernardino, Ventura, Riverside, and San Diego counties; and the smaller is a region mostly contained in Tulare County, in the southern part of the San Joaquin Valley. Minor concentrations of acreage are found in northern

California and in the desert regions in southeastern California.

There is a wide variation in the geographical distribution of California Valencias and navels. The northern California district grows navels almost exclusively; Tulare, Riverside, and San Bernardino counties favor the navels by more than 2 to 1; Los Angeles contains more than two and one-half acres of Valencias to one acre of the navels; Orange, San Diego, and Ventura counties contain mainly Valencias.

In 1950 the orange-producing counties in California had variable amounts of their total orange acreage in a nonbearing status. Counties with larger acreages also generally had the larger number of nonbearing acres. Orange County contained the most nonbearing acres—3,336; Ventura and Los Angeles counties had 2,417 and 1,546 acres; and Tulare, San Diego, and Riverside counties each exceeded 800 acres. All other counties had less than 300 nonbearing acres.

Yield. Along with bearing acreage, production is determined by the level of yield.

Orange yields in California generally followed an upward trend until the middle of the 1940's. California orange yields per bearing acre during the five seasons following 1919-20 averaged 122.7 boxes compared with an average of 140.3 boxes for Florida. The yield in California increased irregularly to a peak of 254.4 boxes per acre in 1944-45 and then tended downward, averaging about 195 boxes per acre in the past several years.

Florida yields fell sharply in the early twenties to a low of about 70 boxes per bearing acre, then recovered during the 1930's, and continued to rise in the 1940's. During the past five years, Florida yields have exceeded those in California, although this was not generally so before the mid-1940's. The decrease in California yields during the past few years has reflected in large part the unusual cold-weather freezes in the orange-producing districts. The relatively rapid increase in Florida yields can be explained in part by the increasing age of trees and greater maturity and yielding capacity associated with age; in addition, many in the Florida industry attribute much of the increase to the development of the minor-elements fertilization program in that state.

Within California both Valencia and navel orange yields per bearing acre responded to much the same factors but showed some independent variation year by year. Over five-year periods, however, average yields were quite close, consequently following about the same pattern as total California yields. The average yield in the early 1940's was over 200 boxes per bearing acre as compared to less than 190 boxes in the late forties.

Relations Between Production, Acreage, and Yield. The trends for California production, bearing acreage, and yield are brought together in figure

7. The short-term fluctuations in California production have been caused primarily by the short-term changes in yield per bearing acre. But the long-term trend of production has been determined by the trend in bearing acreage. Figure 7 suggests that the sharp rise in California production from 1939-40 until 1944-45 was due primarily to unusually high yields, and the downward drift of production after the peak of 1944-45 was due to decreased yields and acreage. The indicated sharp drop in acreage reported for 1949-50 is probably excessive. In 1949-50, a tree count was made and served as the basis for suggesting the much reduced bearing acreage in that year. However, the acreage probably decreased over a period of years rather than dropping suddenly as shown in the published acreage figures; but no revisions were published for the years prior to 1949-50. This view suggests that the figures on yields also require corresponding modification.

While noting the relations among California orange production, acreage, and yield, it is of some importance to review trends in the average size of California oranges. In recent years there has circulated the idea that California oranges are now smaller than before; and that the smaller sizes have contributed to a change in consumer attitudes reflected in sales and prices.

Figure 8 shows the average sizes of California Valencias and navels shipped to market since the 1924-25 season. From that record it is clear that both varieties have fluctuated fairly widely from year to year, depending in large part on climatic and production conditions. For the period as a whole, since 1924-25, Valencia shipments averaged at a size of 235 per box, and navels almost 200 per box. No sharp trend is clearly evident in the sizes of either Valencias or navels shipped. The fruit marketed fresh in the latter half of the period averaged a little smaller than in the first half. But these

Figure 7. Orange Production, Acreage, and Yield in California, Indexes from 1919/20.

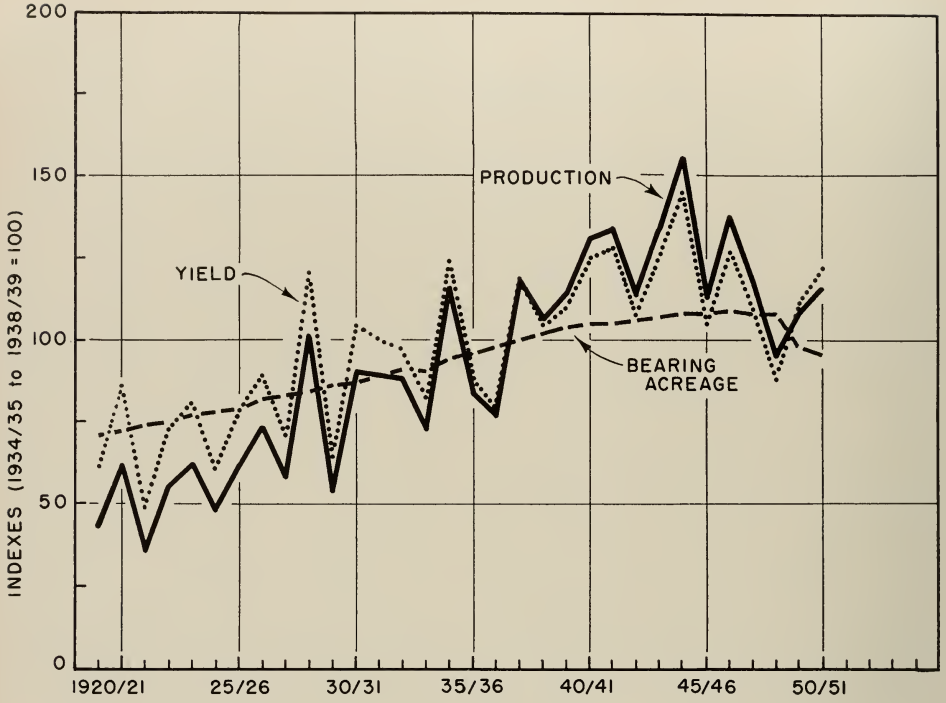
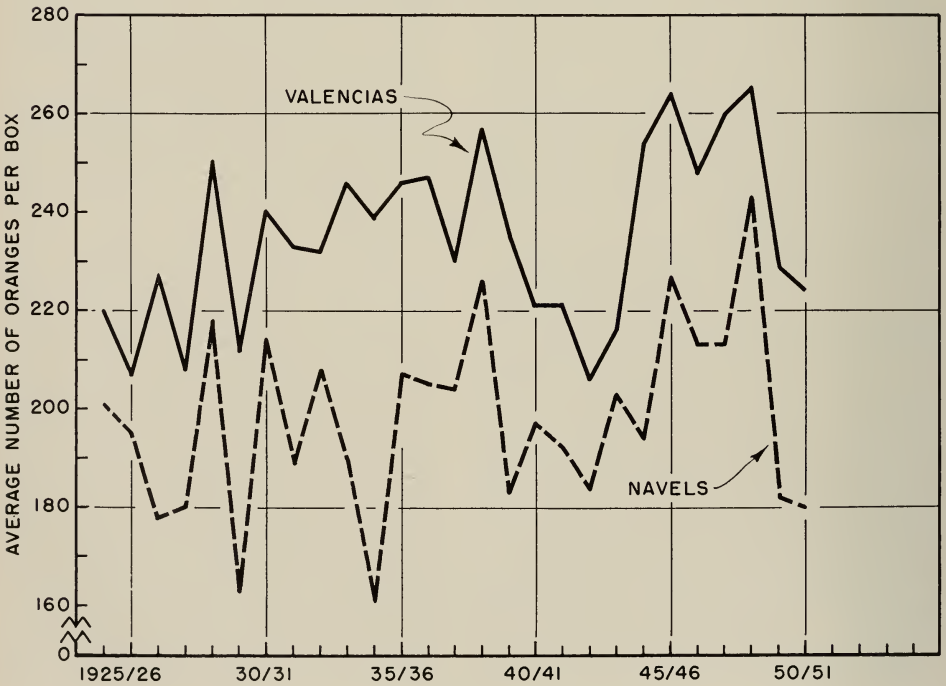


Figure 8. Average Sizes of California Oranges Marketed Fresh, by Navels and Valencias, from 1924/25.



data describe the situation for fresh oranges shipped to market.

When the data on production are examined, a somewhat different picture is revealed. Inspection of sample data on the sizes produced suggests that beginning in the mid-thirties the average size of oranges produced tended to be smaller than earlier.* This trend continued until recently when it was reversed. Now, sizes produced are about back to their earlier level. The period of smaller sizes is not clearly evident from the data on fresh shipments (fig. 8) because fresh marketings tended to be made with the larger oranges, leaving the increased proportion of smaller ones for use in the products outlets.

For Florida oranges the relations between production, acreage, and yield, since 1919-20, are summarized in figure 9. The increased production during the first half of the period was due to increased bearing acreage which rose to more than offset the decreasing and then stable yields. But in the latter half of the period, both increased acreage and higher yields contributed to the phenomenal expansion in production, although the much higher level of yield appears to have been the more influential.

How the interactions of bearing acreage and yield and their resulting effects on production differ between California and Florida is evident from comparing figure 7 with figure 9. Comparison shows how bearing acreage in Florida rose more sharply than in California, and how yields in Florida have in recent years advanced more than the yields in California. Hence, it is both a greater increase in acreage and a greater increase in yields which underlie Florida's orange production surpassing that of California.

Utilization. The utilization of United States orange production can be described under two major classifications—

fresh use and processed use. Only fifteen years ago over 90 per cent of the orange crop was used in its fresh form, but now only about half is so used (see fig. 10). In the middle 1930's only 2 or 3 per cent of the crop was processed into single-strength orange juice while the remainder of the oranges processed went into citrus salad, citrus segments, feed oil, meal, bottler's base, dairy base, and as "fruit produced but not utilized."

During World War II, the production of canned single-strength orange juice increased to slightly over 20 per cent of the total crop in 1945-46 (partly due to increased military demand). It reached an all-time high in 1947-48, and since then has remained above 16 per cent of the national orange crop.

Probably the most important change that has taken place in recent years is the introduction and rapid increase of frozen concentrated orange juice during the past five years. As much as 22 per cent of the United States orange crop in 1950-51 was utilized in this form. These developments are only noted here; later on, their impact will be considered in some detail.

Until 1945 there was an upward trend in per-capita consumption of fresh oranges; the drift is suggested by a growth from 17.4 pounds in 1925-26 to a high of 47.4 pounds in 1944-45. Since then, the per-capita trend has been down and last year was near the level of the 1930's. At the same time, the per-capita total consumption of fresh fruit other than citrus decreased until the middle 1930's, then leveled out for several years; a sharp drop occurred in the early 1940's, but the trend has been slightly upward during the past half-dozen years, although earlier levels have not yet been regained.

The trend in California oranges used fresh has broadly followed that of total United States oranges. The difference is

* Data on orange sizes produced are difficult to locate. Some sample data are summarized in G. M. Kuznets and Robert F. Jennings, Relation of Average Size and Yield of Oranges to Selected Weather Factors, University of California College of Agriculture Exp. Sta. June 1950.

Figure 9. Orange Production, Bearing Acreage, and Yield in Florida, Indexes from 1919/20.

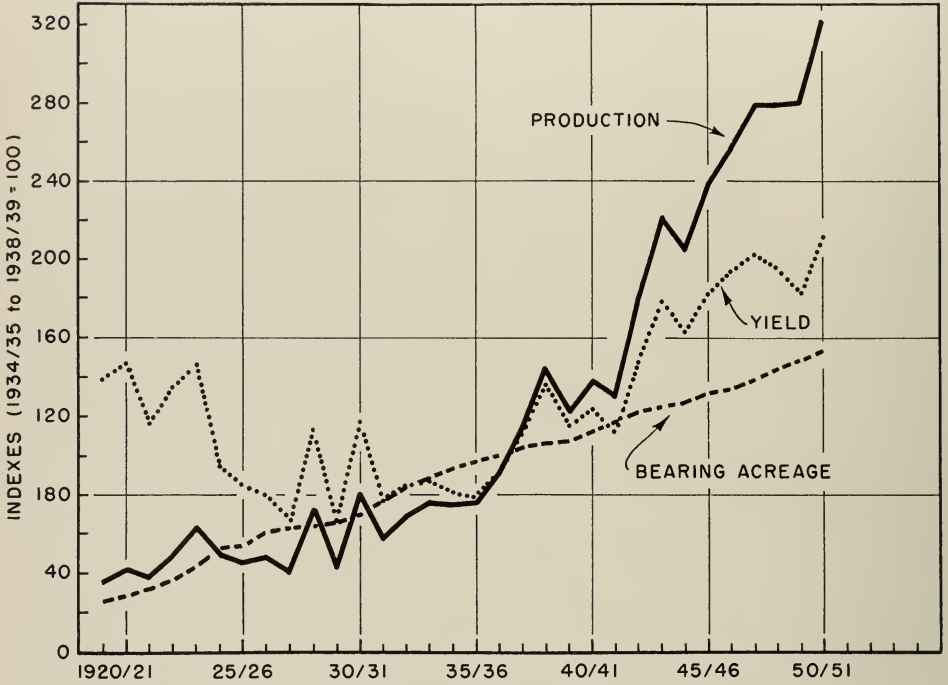
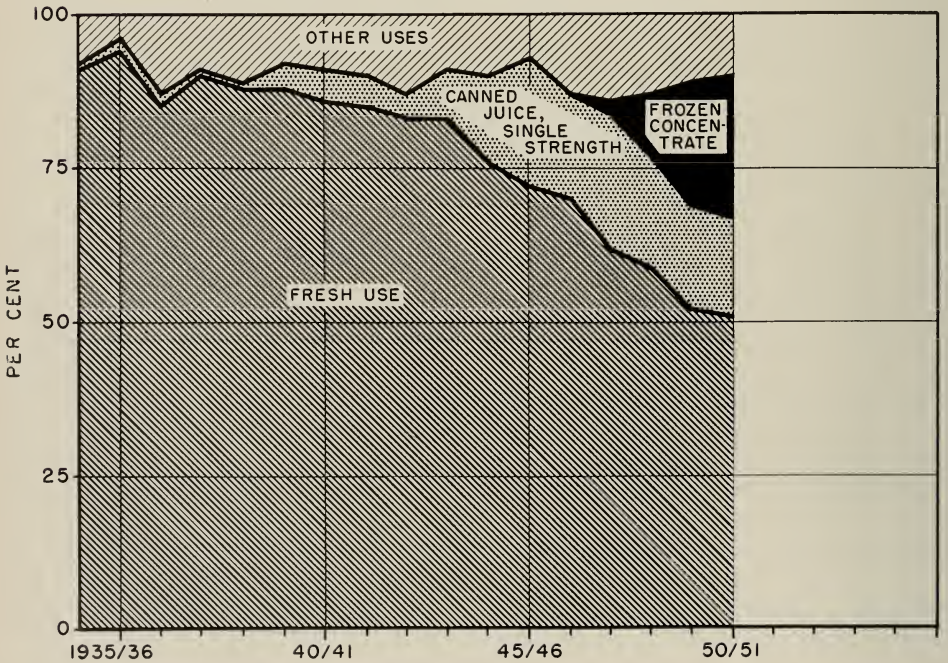


Figure 10. Uses of United States Production of Oranges and Tangerines, by Per Cent of Fresh Fruit Equivalent, from 1934/35.



that total United States oranges used fresh increased more rapidly, reflecting the more rapidly expanding production and fresh shipments in Florida and other producing states. But it is to be noted that fresh usage of total United States oranges, as did California oranges, took a downturn in the middle forties and has irregularly tended downward since then.

The relative position in the use of California fresh oranges is indicated by noting California's shifting share of the national total. In terms of both proportion of national production and proportion of national fresh usage, California's relative share followed a downward trend. It is significant, however, that the California proportion of fresh usage in recent years has held up better than the proportion of national production. This reflects the tendency in those years for other states, especially Florida, to enter the processed markets more aggressively than California.

The utilization of California oranges in fresh form did not increase as rapidly as the fresh utilization of United States oranges. California's share decreased from about 60 per cent during the twenties to about 45 per cent during the past few years. Prior to the middle 1940's, California's share in total orange production of the United States usually exceeded slightly California's share of the national total of oranges used for fresh consumption. This situation was reversed since 1943-44. In 1950-51 California's share of national orange production was about 34 per cent as compared with its share of 46 per cent of total oranges used fresh. The state's maintenance of a relatively higher share in the fresh market was reflected by a lower share of the processed market.

Thirty years ago very few oranges were processed in this country. The insignificant quantity processed represented mainly culls and fruit not shipped fresh because of expected unfavorable returns. Now, however, processed oranges make

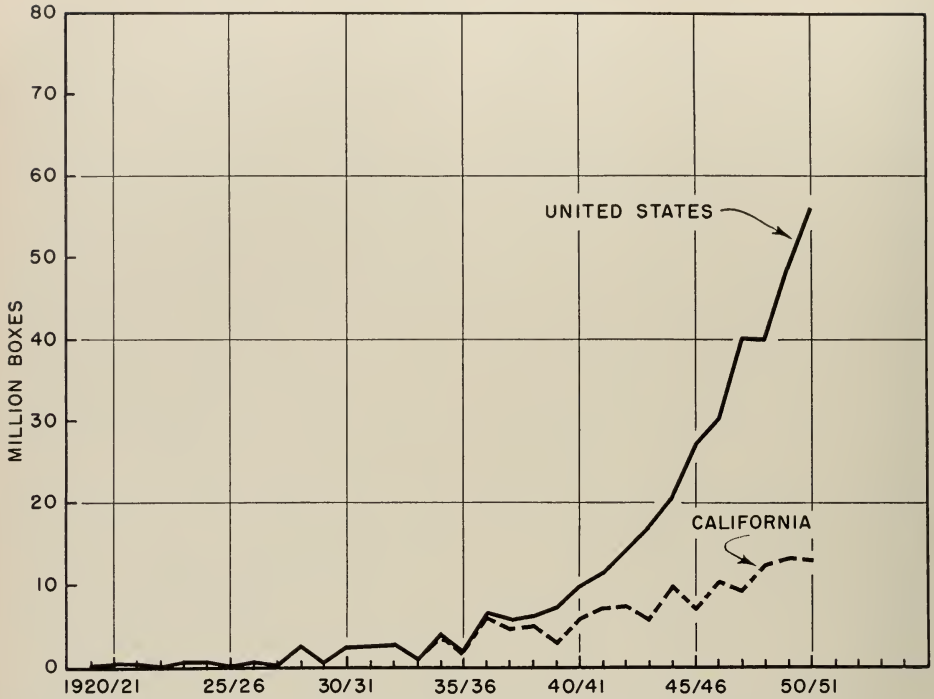
up a very important tonnage—over 55 million boxes in 1950-51 (see fig. 11).

As the processed orange outlet expanded, California's participation was not as marked as Florida's. Hence, there was a declining proportion of the national total of oranges processed made up of California oranges. Twenty years ago practically all oranges processed were California oranges. The situation changed rapidly, and during the past several years California has accounted for only about 25 per cent of the nation's oranges processed. The volume of oranges processed which were produced in other states, increased much more rapidly than for California.

In all orange-producing states there has been an increasing portion of the orange crop diverted to processed uses. During the latter half of the 1930's, the proportion of California's orange crop processed exceeded the proportions of other states. But since 1939-40, Florida has processed a larger share, reaching a record of about 62 per cent in 1950-51 as compared with 29 per cent for California the same year. During the past 10, and especially within the past 6 years, Florida has put a rapidly increasing share of her crop into the processed outlets. California's trend has been upward, but only slightly so. In the past three years, however, the state's proportion increased substantially.

Within California, more Valencias have been processed than navels (see fig. 12). The quantity of California Valencias processed has about quadrupled from nearly 3 million boxes in 1934-35 to almost 12 million boxes in 1950-51; the quantity of navels processed, meanwhile, increased from 694,000 to 1,053,000 boxes. Last year 39 per cent of the California Valencias and only 7 per cent of the navels were processed. But in Florida over 60 per cent of both types—Valencias, and early and midseason—were processed last year. This indicates how the growth in the processed outlet has

Figure 11. Oranges Processed, United States and California, from 1919/20.



had differing impacts on the orange industries in the two states.

So far, we have been concerned with the portion of the orange crop processed. The processed oranges go into various orange products. Canned single-strength juice and frozen concentrate are the two most important ones in terms of volume.

Until recent years, single-strength canned orange juice was the most important product of the processed oranges. Florida packed 38,000 cases of 24 No. 2 cans in 1929-30, the first year, and has continued packing the major portion of the United States pack. The total national pack in 1950-51 was about 22.5 million cases, with Florida contributing over 20 million and California-Arizona about 1.6 million (see fig. 13). The pack rose sharply during the war years and, even after some reduction, remained high.

In 1935-36 Florida began packing blended orange and grapefruit juice and has since increased the annual pack to a peak of 12,267,000 cases of 24 No. 2's in

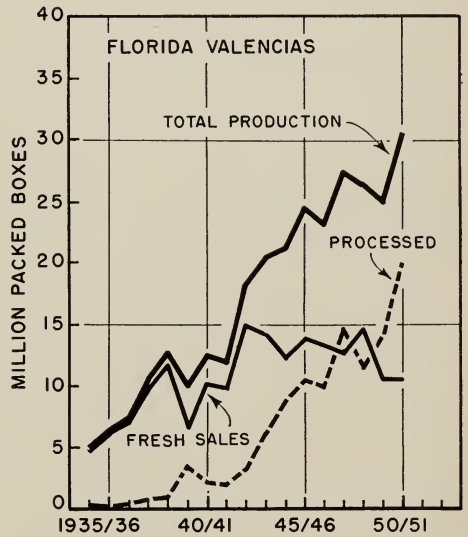
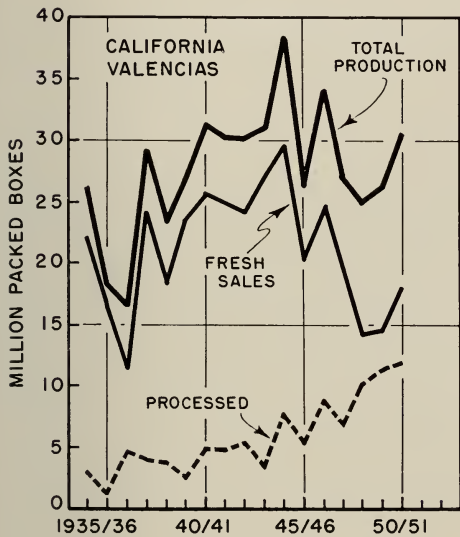
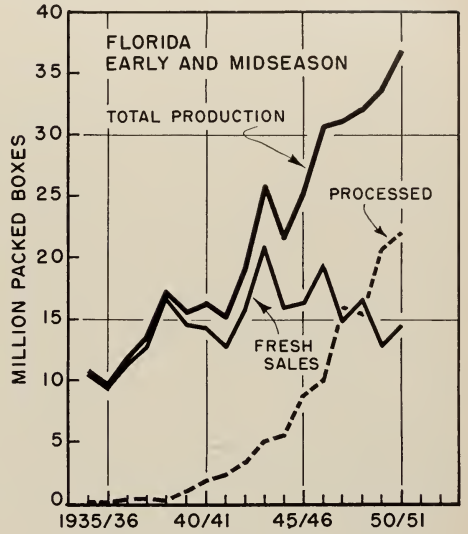
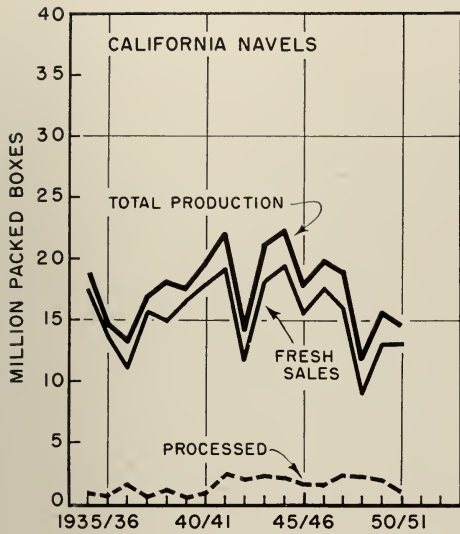
1945-46. The United States pack in 1949-50 was 7,400,000 of which Florida contributed 6,768,000 cases.

The production of frozen concentrated orange juice started on a noticeably commercial scale in 1945-46 with an output of 226,000 gallons—all in Florida. Production increased rapidly and in 1950-51 Florida packed 31 million gallons, while California packed about 4 million gallons (fig. 14).

An even newer product, frozen concentrated orange-grapefruit blend, was first sold in 1948-49 with production of 112,000 gallons. Output was increased the following year to 33,000 gallons in California and 1,303,000 gallons in Florida. The next year's pack, 1950-51, declined to 245,000 gallons in Florida with none in California-Arizona.

Canned orange concentrate has been produced for ten years in both the principal states. In 1950-51 California packed 3,251,000 gallons, while Florida packed 2,529,000 gallons.

Figure 12. Orange Production and Uses, California and Florida, by Varieties, from 1934/35.



During each of the last three years, California-Arizona has produced over 2,300,000 gallons of fresh, single-strength juice and over 400,000 gallons of frozen, single-strength juice.

The marked expansion in orange products, especially frozen concentrate, has had a significant impact on the orange industry. The nature of this impact is discussed in detail in later sections of this

report. But the developments sketched above clearly indicate that the structure and operations of the orange industries are dynamic; they are constantly changing in response to new developments and in turn affecting other developments. An appraisal of such response to new conditions is not the objective of this section. Here we only sketch what has happened; the next section will interpret these de-

Figure 13. Pack of Canned Single-Strength Orange Juice, United States, Florida, and California, from 1931/32.

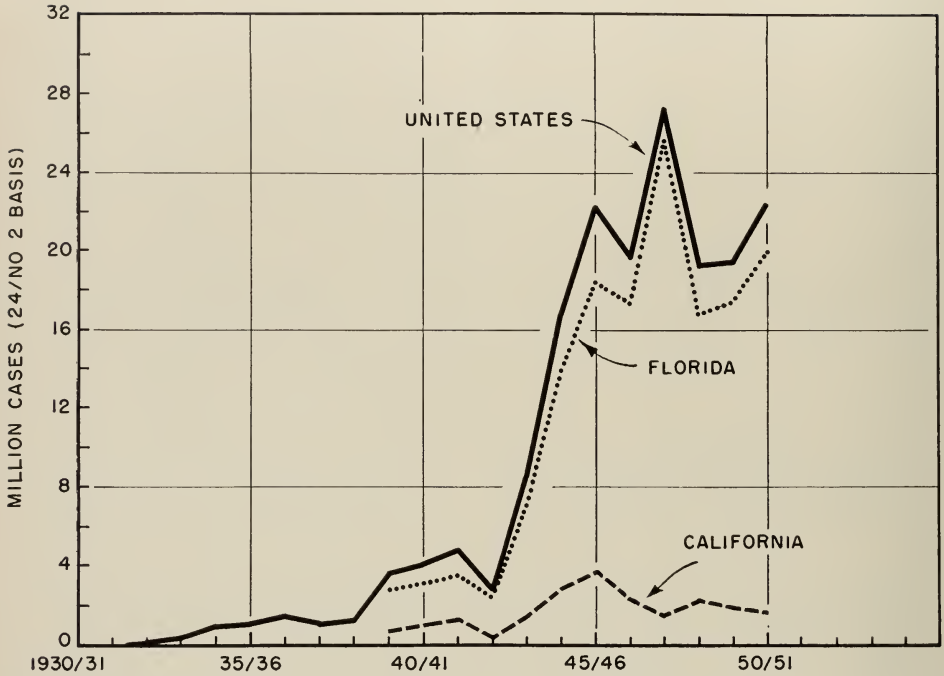
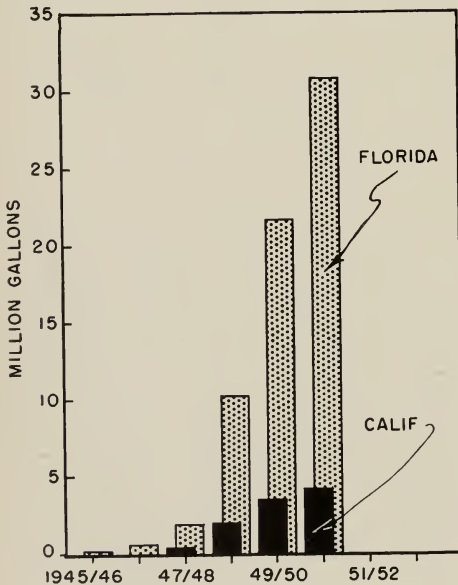


Figure 14. Pack of Frozen Concentrated Orange Juice, California and Florida, from 1945/46.



velopments and consider their implications. But first it is necessary to look further at the situation in shipments, and costs and returns.

Fresh Shipments. Shipments of fresh oranges from Florida follow a distinct seasonal pattern. The height of the shipping season is during the winter months. In the spring and early summer the shipments fall off rapidly, and are negligible during July, August, and September. This general pattern is typical of the experience year after year. During the past several years, however, the seasonal peak occurred earlier than usual—in December–January rather than March.

Shipments of fresh oranges from California also follow a distinct seasonal pattern. Beginning the shipping year with November, shipments rise in December, partly reflecting the holiday market. Thereafter, a dip generally occurs, followed by a gradual rise until July when

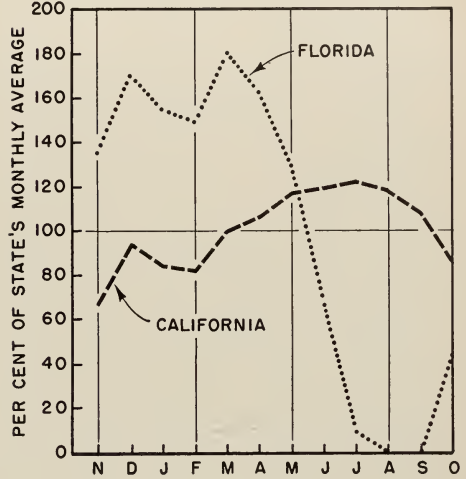
the annual peak is reached. After July, shipments gradually fall off until the end of the shipping year and the following rise in December.

The differential seasonal patterns of fresh shipments from Florida and California are shown in figure 15. It is evident that in the fresh orange market Florida shipments and California shipments attain their respective peaks in different parts of the year. Winter shipments dominate those from Florida, while summer shipments dominate those from California. These patterns generally prevail for the state, as a whole, although differing patterns exist by varieties and districts.

When California navels and Valencias are considered separately, distinct seasonal patterns are clear for each variety. As shown in figure 16, the navel fresh shipping season is heaviest during the winter and early spring, while the Valencia fresh shipping season is heaviest during the late spring and summer. Thus, the California navel fresh shipping season in large part coincides with the Florida fresh shipping season. But the California Valencia fresh shipping season is to a considerable extent free of simultaneous fresh shipments from Florida. There have been short-term exceptions in some years when the shipping patterns varied widely from their typical form.

Within California, fresh shipments of the two varieties from the several districts make a fairly complicated picture. The situation is summarized in figure 17. The seasonal patterns of navel shipments from the central northern California and Arizona-Desert Valley districts coincide. Both have sharp peaks in December and then fall off rapidly; by late winter the large bulk of their navels are usually shipped. The southern California navels, however, approach their peak in March—and less sharply; also, they decline less sharply. By the end of May, the southern California navel shipments are com-

Figure 15. Seasonal Indexes of Fresh Shipments of Oranges from California and Florida.



pleted. Thus, although there is generally some overlap in the fresh navel shipping periods of the three districts, the bulk of the navels from the southern California district is made after most of the navels from the other two districts have been shipped. Most of the overlapping in shipping periods occurs during January and February.

Figure 16. Seasonal Indexes of Fresh Shipments of California Oranges, Navels and Valencias.

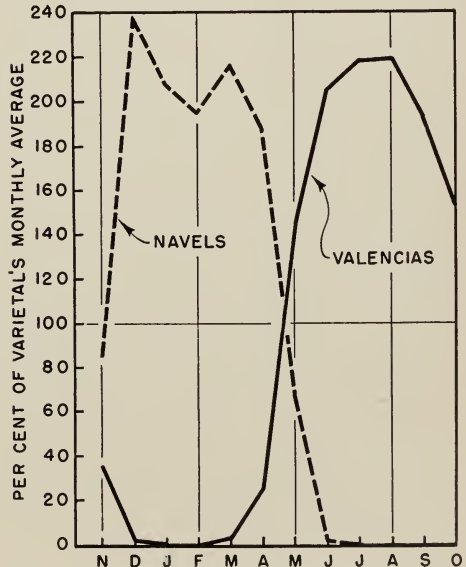
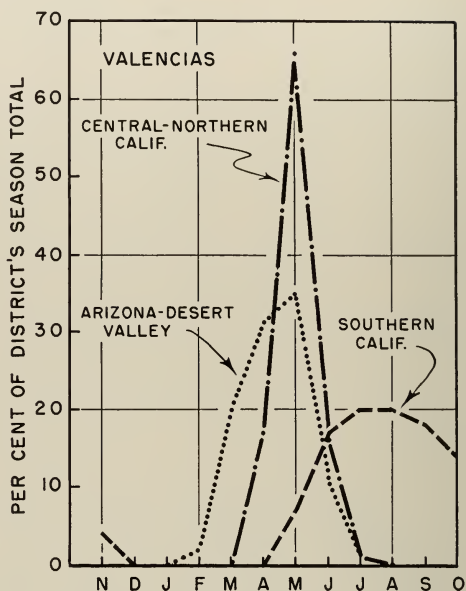
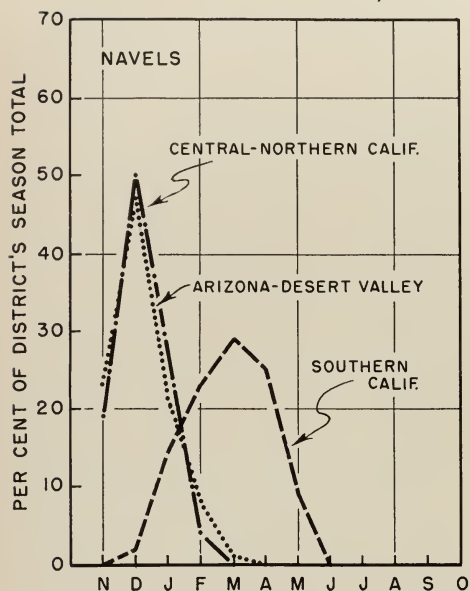


Figure 17. Seasonal Indexes of Fresh Shipments of California Oranges, by Varieties and Districts.



The district seasonal shipping patterns of Valencias are also shown in figure 17. The Arizona-Desert and central-northern California periods overlap to a considerable extent, and they both overlap somewhat with the period of southern California Valencias. About three-fourths of the southern California Valencias are shipped after the heavy shipments from the two other districts. The most intensive overlapping in the shipping periods of the three districts occurs during May and June. The general problem of overlapping shipping periods among districts has been a difficult problem in the marketing of California oranges.

Orange Exports. The orange industries have enjoyed an export market for fresh oranges. During the prewar years, Europe—especially the United Kingdom—was a profitable market. During the war, exports to Europe were cut off, but the Canadian market expanded. In some of the war years, and especially in the postwar years, canned orange juice was sent to the European continent and the United Kingdom as part of the lend-lease and foreign aid programs.

The relative position of the orange export market, and the part Canada plays in it, is summarized on page 29.

To encourage the exports of oranges and orange products to foreign countries, and to develop export markets, the federal government during the past two years has maintained an export program. The export-payment program for the 1950-51 season provided for federal payments of up to 50 per cent of the export sales price, basis free aside ship, United States ports. Under that program, the United States exported about 2.75 million boxes of fresh oranges, about 260,000 cases (24 No. 2 basis) of canned single-strength orange juice, and more than one million gallons of hot-pack concentrated orange juice. With total exports of fresh oranges in 1950-51 at about 6.6 million boxes, more than 40 per cent of the total was moved into foreign markets under the federal export-payment program.

Unlike the domestic lemon industries, the United States orange industries have not been faced with the threat of serious price-depressing imports.* In recent

* See footnote on page 4.

U. S. Exports of Fresh Oranges and Canned Orange Juice

Period	United States production	United States exports			
		Fresh oranges total	Fresh oranges to Canada	Canned orange juice	
		million boxes			million cases 24/2 basis
Five-year averages:					
1924-25 to 1928-29.....	38.7	3.27			
1929-30 to 1933-34.....	47.1	3.40	2.29		
1934-35 to 1938-39.....	64.7	5.24	2.74		
1939-40 to 1943-44.....	88.5	4.82	4.56	0.59	
1944-45 to 1948-49.....	110.9	6.70	5.12	1.28	
Annual:					
1949-50.....	108.5	5.02	3.34	1.41	
1950-51.....	112.8	6.60	4.11	1.84	

years, however, increased plantings in Mexico have resulted in some imports of Mexican oranges. As the Mexican acreage and production increase that country may have more oranges for export to the United States.

Costs, Cultural and Marketing.

Trends in cultural costs are difficult to review. It is difficult to obtain cost figures which are appropriate for, or representative of, a large group of growers. Each grower usually faces cost conditions which differ from those faced by other growers. The available cost figures, aside from the question of accuracy, do not presume to be representative of the industry at large. The figures must be interpreted appropriately; yet, the year-to-year changes and especially the trends in the available cost figures may suggest prevailing broad tendencies in the industry. It is with that view in mind that we here survey the trends in the costs of producing oranges in California and Florida. Marketing costs are also surveyed, and they may be viewed as more representative of the industry at large than are cultural costs.

Through the past quarter century, cultural costs incurred in the production of

oranges have been lower for Florida than for California growers. In both states cultural costs in terms of packed-box equivalent tended downward until the end of the 1930's. But since 1940, cultural costs in California have followed a marked upward trend. This has prevailed in both California Valencias and California navels. Although Florida cultural costs now average higher than ten years earlier, the extent is not so marked as in California. In fact, Florida cultural costs have fluctuated around a nearly constant level the past six or seven years in contrast with the rising trend for California. But Florida's advantage in terms of its lower cultural costs has become even more marked within the past decade. This situation has developed for two reasons. Florida's yields have increased sharply; and costs for labor, irrigation, taxes, and other items have increased more in California than in Florida.

When the situation in total costs for picking, packing, hauling, and selling is surveyed, the figures suggest that the advantage of lower costs was in California's favor until the middle 1940's. After 1945-46, the advantage shifted in favor of Florida.

The cost of transporting the oranges to the fresh market may be surveyed by reference to California shipments to the Eastern Seaboard blanket territory and Florida shipments to the New York City market. As may be expected, the rail transportation cost has been in favor of Florida because of its smaller distance from the eastern markets. Because of changes in the rate structure over the years, California is now at a greater disadvantage—in terms of transportation costs—than it was 20 years ago.

The total costs for cultural and marketing operations up to delivery at the terminal markets are meaningful measures of the relative positions of orange growers in California and Florida. A survey indicates that the total costs declined in both states until the late 1930's. During the past 10 or 12 years, total costs have advanced in both states, but the rise has

been substantially more in California. The trends in costs in terms of broad averages are summarized in the table on this page.

Returns, Fresh and Processed.

California fresh oranges have been sold for higher prices per packed box in eastern auction markets than have Florida fresh oranges. This situation has prevailed over the years and reflected consumer-trade preferences in favor of California fresh oranges. The auction differential has varied from year to year and in recent years has been as much as \$1.52 a box. Since the Florida box is rated at 90 pounds and the California box at 77 pounds, the differential in favor of California is even more pronounced. Similar differentials have existed in private markets. The existence of the differential has helped to offset the higher costs incurred by California oranges. In other terms,

Some Costs of Producing and Marketing California and Florida Packed Fresh Oranges

Estimated Costs	Five-year averages					1949-50	1950-51
	1924-25 to 1928-29	1929-30 to 1933-34	1934-35 to 1938-39	1939-40 to 1943-44	1944-45 to 1948-49		
	dollars per packed box equivalent						
Cultural costs							
California navels	1.25	.95	.72	.63	1.12	1.05	1.15
California Valencias	1.46	1.03	.78	.63	1.13	1.11	1.10
Florida oranges . . . . .	....	.56	.41	.43	.50	.52	.57
Pick, pack, haul, and sell							
California oranges . . . . .	.87	.78	.76	.88	1.34	1.51	1.53
Florida oranges . . . . .	....	1.03	.90	.99	1.28	1.38	1.40
Transportation to Eastern Seaboard							
California oranges	1.31	1.29	1.20	1.24	1.43	1.67	1.67
Florida oranges . . . . .	....	.91	.68	.64	.84	1.08	1.14
Total costs delivered to market							
California navels	3.43	3.02	2.68	2.75	3.88	4.23	4.35
California Valencias	3.64	3.10	2.74	2.75	3.89	4.29	4.30
Florida oranges . . . . .	....	2.50	1.99	2.06	2.63	2.98	3.11

Average Auction Prices of California and Florida Oranges

Period	During Florida shipping season only		During California crop year	
	California oranges	Florida oranges	California Navels	California Valencias
	dollars per box			
Five-year averages:				
1925-26 to 1928-29	4.91	4.30	4.67	5.48
1929-30 to 1933-34	3.77	3.29	3.56	4.30
1934-35 to 1938-39	3.32	2.62	3.03	3.70
1939-40 to 1943-44	4.04	3.04	3.65	4.55
1944-45 to 1948-49	5.16	4.01	5.27	5.07
Annual:				
1947-48	4.68	3.27	4.86	5.26
1948-49	5.75	4.23	6.34	5.05
1949-50	5.04	4.85	5.15	5.35
1950-51	5.43	4.29	5.62	5.48

the apparent consumer-trade preference for California fresh oranges has permitted California growers to continue their operations despite their higher costs. This, of course, is only part of the situation, but it is an important part.

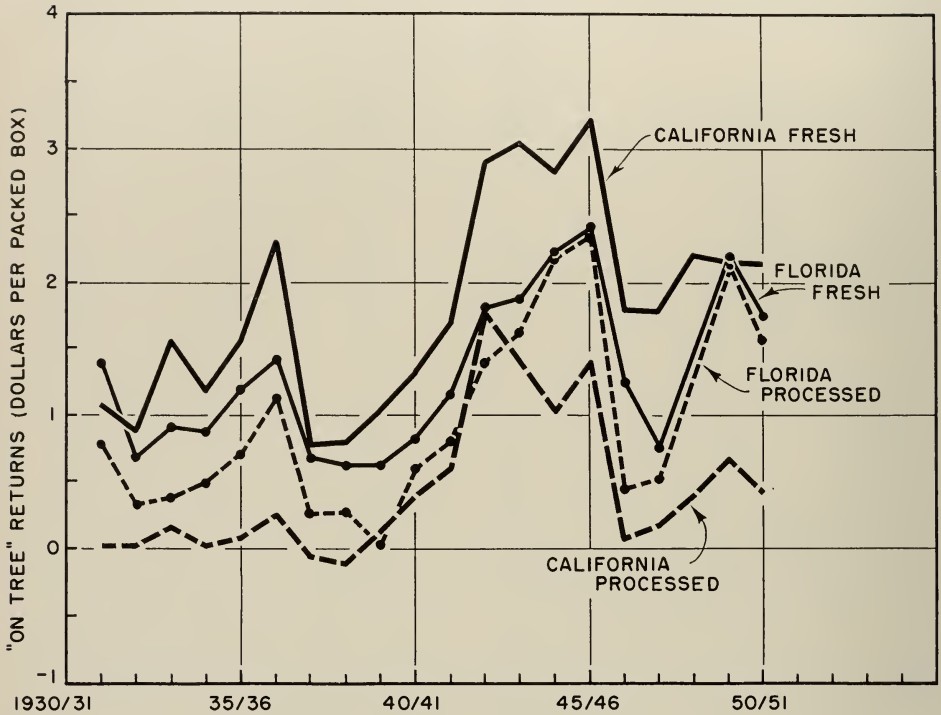
The differentials in terminal markets in favor of California oranges have been sufficient so that even on an f.o.b. basis California oranges have returned higher per-box prices than Florida oranges. Season average f.o.b. prices per box have been higher for California oranges than for Florida oranges every year during the past quarter century, except in one year, 1931-32. The strong consumer-trade preference for California fresh oranges more than offset the higher transportation costs incurred by California oranges. At a comparable f.o.b. shipping point basis, California orange shippers have been generally in a favored position, as compared with Florida shippers, if f.o.b. prices are considered as the basis of comparison. This, of course, applies to fresh shipping oranges. The relative positions of oranges for processing is noted later.

In the past, California Valencias shipped fresh have generally tended to

return higher f.o.b. prices than did California navels. Consumers were generally willing to pay higher prices for California summer oranges (mainly Valencias) than for California winter oranges (mainly navels). This situation generally prevailed, but recently exceptions have occurred. In some years the differential was only a few cents, in other years more than a dollar. But the existence of the differential and the industry's awareness of it was symptomatic of the widely accepted view that Valencia growers were in a favorable position compared with navel growers. Now, the situation is changing.

Another way to compare the relative positions of California and Florida growers of oranges is to look at the on-tree returns. In figure 18 such returns are shown, since 1931-32, for the two states separately by oranges shipped to fresh market and to processing. Although the four series move to some extent in common, there are important differences: Except for the depression year of 1931-32 and the recent year of 1949-50, the on-tree value per box of California oranges shipped for fresh use (Valencias and navels combined) exceeded the on-

Figure 18. "On Tree" Returns from California and Florida Oranges, Fresh and Processed Uses, from 1931/32.



tree value per box of Florida oranges either shipped for fresh use or for processing. Florida's fresh fruit value per box exceeded that state's value per box of fruit for processing, but the differential was much narrower than in California. Aside from 1939-40 and 1942-43, the on-tree price of California oranges processed was below—and in most years substantially below—the returns from processing received by Florida oranges. In 1949-50 a new situation appeared. For the first time on record, Florida on-tree per box returns from both fresh and processed uses exceeded California on-tree per box returns from oranges shipped fresh. The 1949-50 freeze in California adversely affected the quality of the fruit and tended to lower on-tree per box returns to California growers in contrast with the much increased returns going to Florida growers. This situation reflects the changing relationships which have developed in the orange industries in the

past several years. The situation is dramatically reflected by the sharp advance in Florida on-tree returns—fresh and processed—after 1947-48, compared with the on-tree returns in California.

When we look at developments within California, changing economic relationships among on-tree returns again are apparent. On-tree per box returns from oranges shipped for fresh use exceed by a substantial amount those from oranges processed. This is true for both Valencias and navels. But until recent years, the on-tree returns for Valencias used fresh averaged higher than for navels used fresh. During the past several years, the situation has been reversed.

When we look closer at the returns from California oranges processed, we note another changing relationship. During the past decade, processed Valencias have returned more than processed navels because the Valencias are more acceptable for processing, especially for

Figure 19. Average "On Tree" Returns from All Uses, Cultural Costs and Net Returns for California Oranges, by Varieties, from 1924/25.

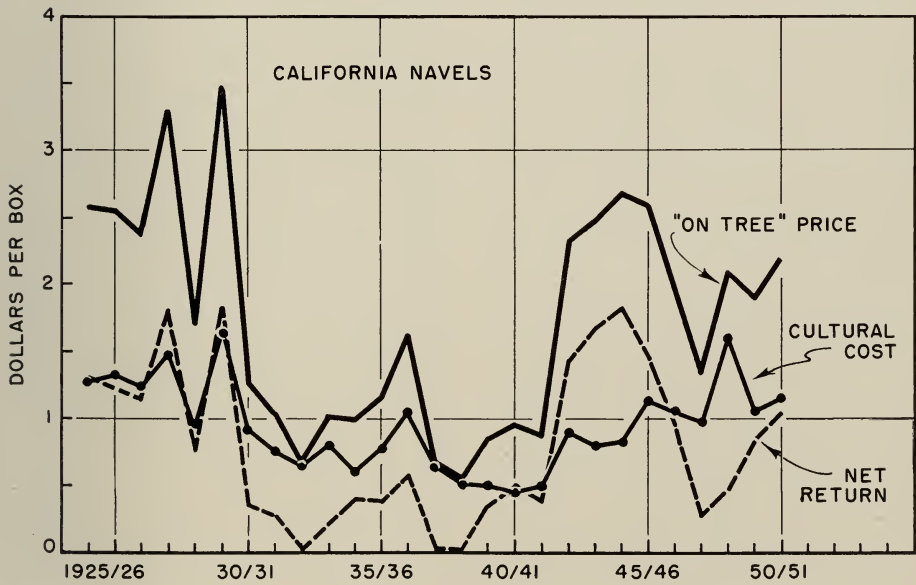
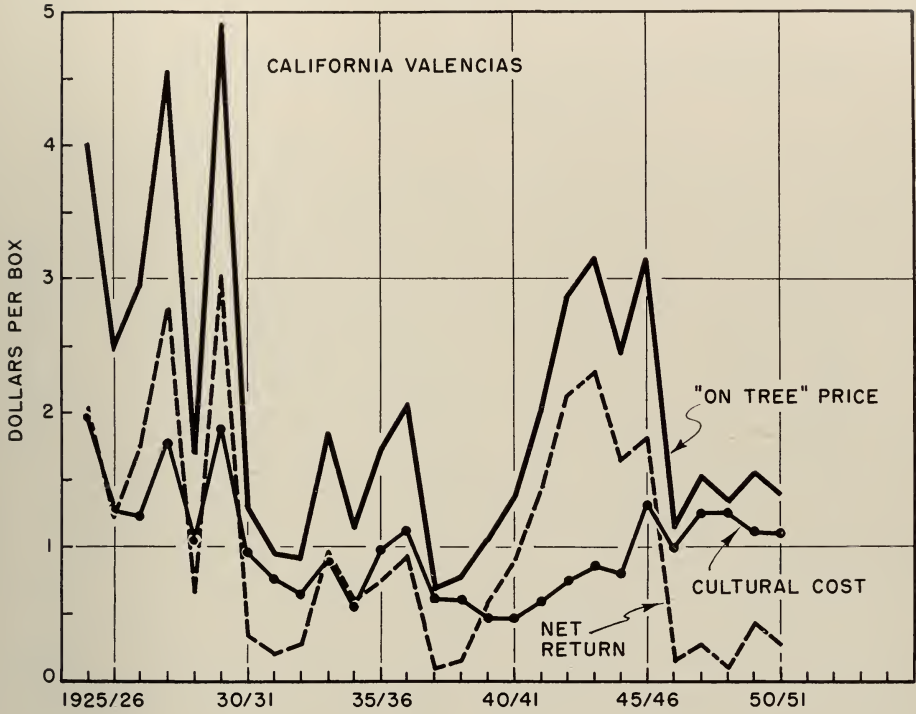
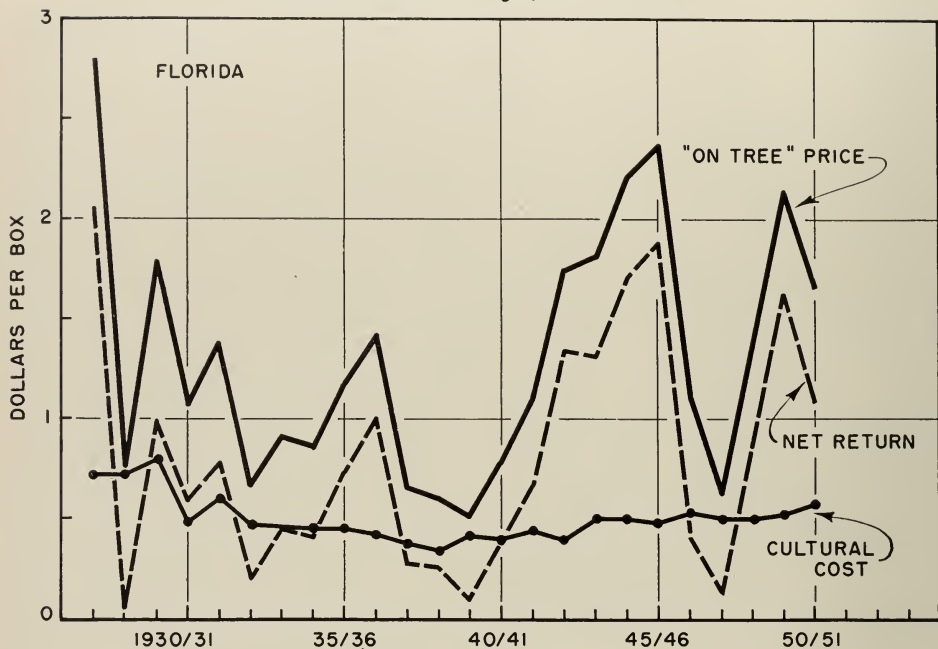


Figure 20. Average "On Tree" Returns from All Uses, Cultural Costs and Net Returns for Florida Oranges, from 1927/28.



juice uses. During the postwar years, however, the differential in favor of Valencias has widened greatly. The on-tree returns from Valencias processed have increased since 1946-47, while at the same time the on-tree per box returns from navels processed have not advanced and have even reflected "red ink" or net losses. It is clear that the relative positions of Valencias and navels are subject to differing impacts from the developments in the markets for processed orange products.

We have compared the trends in cultural and marketing costs and on-tree returns, fresh and processed use, for Florida oranges and California oranges—navels and Valencias. We can approximate the net positions of the several segments of the industry even more closely when we survey "net returns." Such returns are not really net since neither orchard depreciation (replacement of trees) costs nor interest on orchard investment are included in the computations. The returns are for currently in-

vested capital without providing for its replacement. The results, although not precise, may be viewed as indicative of the general trends.

Review of the series of annual estimates of net-returns suggests that, during the prewar years, California net returns generally compared favorably with those in Florida, and during those years, California Valencias yielded better net returns—dollars per box—than did California navels (see figs. 19 and 20). In the postwar years, however, the situation was substantially different. Florida growers have experienced much better returns than California growers. Furthermore, California navels yielded better net returns than California Valencias which became seriously depressed in 1946-47 and recovered little since then.

These drastic differences in net returns reflect changing economic relationships which developed in the postwar years. In this section of the report we merely indicated what happened. To provide adequate background for understanding

the current and prospective situation, we also need information on the demand for oranges and orange products. Hence, in

the next section we turn to the demand characteristics of oranges and orange products.

DEMAND CHARACTERISTICS OF ORANGES AND ORANGE PRODUCTS

In the preceding section we surveyed the trends in orange acreage, production, yields, shipments, utilization, costs and returns. But important developments have also occurred in marketing and in the consumers' attitudes or preferences. These are reflected in the demand for oranges and orange products. The nature of these changes in demand, as well as the need for considering the trend in demand, makes it advantageous to combine such materials into this separate section.

First, we shall discuss the notion of demand and indicate its usefulness in our consideration of changing economic relationships in the orange and orange products industries. Next we shall present and discuss the results of statistical analyses of California fresh oranges, winter and summer, on a seasonal basis. Then we shall consider the available evidence pointing to the nature of the demands for orange products and their relations to the demand for fresh oranges. Such materials will provide necessary background for appraising the changing economic relationships in the orange and orange products industries.

What Is "Demand"? At the outset, we must have a clear and precise understanding of what we mean by "demand." This is desirable because we shall consider some statistical evidence bearing on the demand question, and also to clarify the essential relations between price and sales.

We shall be concerned with market demand, the total demand of a large number of actual or potential buyers. It must be recognized that such market demand reflects, is based on, and is influenced by the demands of many individuals. The

statistical evidence we shall consider reflects the group effects of many separate individuals with different tastes, preferences, incomes, and demand ideas. We shall view the market demand relations as the tendencies prevailing for the market group as a whole, although many of the individuals may have different tendencies.

The term "demand" is used widely and often loosely in marketing discussions. It is frequently used to mean the quantity of a product, say oranges, which has been sold or the market has taken. A more acceptable and useful interpretation refers to the relation between a schedule of prices and a corresponding schedule of quantities, both schedules pertaining to a particular product in a particular market. Hence, "demand" is representative of various quantities of a product that would be purchased at various corresponding prices in a given market, at a given time, and under given conditions. Those given conditions include fixed tastes and preferences of buyers or potential buyers, fixed amounts of income or money available for expenditures on all goods, and fixed prices of other goods and services. Thus, in a strict sense, the "demand" for a particular product pertains to some given situation in which all influences, except price and quantity of the particular commodity, are given and fixed. In such a context it can be argued that for a given demand, price and quantity of the particular commodity vary inversely; the lower the price the larger the quantity that would be taken, the higher the price the smaller the quantity that would be taken. Demand situations may be described in terms of mathematical equations, expressed as schedules in tabu-

lar form, or graphically pictured as demand curves. Always in the background of such demand curves, however, and influencing their shape and position, are the given conditions such as income and tastes of the buyers, prices of other products, and the characteristics of the particular market.

When considering many problems in orange marketing, the nature of the demand for oranges is of crucial importance. And this is so for two reasons. First, there is the question as to how changes in quantity and changes in price are related for a given orange demand situation, represented by its corresponding demand schedule or demand curve. Second, there is the question as to how the orange demand schedule as a whole responds to changes in the level of factors such as income.

The relations between price changes and quantity changes, for a given demand schedule, are expressed by the phrase "elasticity of demand with respect to price" which we shall call "price elasticity."^{*} The purpose of price elasticity is

^{*} In precise terms, price elasticity at a point on the demand schedule measures the percentage change in quantity which occurs in response to the corresponding percentage change in price. In more specific terms, the price elasticity equals the percentage change in quantity divided by the corresponding percentage change in price; the changes should be small since the price-elasticity coefficient pertains to the relationship at the price-quantity point from which the changes are considered.

When the absolute value of the price-elasticity coefficient is greater than 1, at a certain point on the demand schedule, the demand is said to be "elastic" at the price-quantity combination at that point; when the absolute value of the price-elasticity coefficient is less than 1 at a certain point on the demand schedule, the demand is said to be "inelastic" at that point; and when the price-elasticity coefficient is equal to 1, the demand is said to be of "unit elasticity."

When the price and quantity change, on a given demand schedule, the resulting money revenue increases or decreases, depending upon the price elasticity. When the demand is elastic at a given price-quantity combination on the demand schedule, a small decline in price results in an increase in total money revenue from sales; but when the demand is inelastic at a given price-quantity point, a small decline in price results in a decrease in total money revenue from sales. Conversely, a small increase in price from an elastic point on the demand schedule results in a decrease in total revenue, and a small increase in price from an inelastic point on the demand schedule results in an increase in total money revenue from sales.

If price is the dependent variable (the one whose variation is "explained"), as in the analyses to be summarized below, for statistical reasons it is more appropriate to use an elasticity measure which is the inverse of the price elasticity. This other measure is referred to as "price flexibility," and is equal to the relative change in price divided by the corresponding relative change in quantity. When the absolute value of the price-flexibility coefficient is less than 1, at a particular point on the demand schedule, the demand is said to be "elastic" at that point; when the price-flexibility coefficient is greater than 1, at a particular point of the demand schedule, the demand is said to be "inelastic" at that point; and when the price-flexibility coefficient is equal to 1, the demand is said to be of "unit elasticity."

to measure the responsiveness of purchases to price changes, and it is computed so that its magnitude indicates the behavior of total money returns from sales as they are increased or decreased. Such effects of quantity changes on total revenue explain why it helps to have indications of the price-elasticity coefficients when considering marketing practices. With knowledge about the values of the price elasticities for oranges, for example, one may draw inferences as to the money effects associated with the marketings of different quantities of oranges. For that reason, we shall later review the available statistical evidence bearing upon the price-elasticity coefficients for oranges.

Factors affecting the demand for oranges, such as income, do not remain constant; they change from year to year and sometimes vary widely. Such changes affect the position or level of the demand for oranges, and, as the changes occur, the demand schedule shifts. For that reason, the demand-affecting factors are often referred to as "shift variables."

Such "shift variables" are included in statistical analyses of factors affecting demand and prices. Consideration of the "shift variables" is necessary to estimate the demand or net relation between price and quantity in a given season. They are also needed to estimate how and why the demand schedule shifts position from season to season or over a period of years. The available statistical evidence on the influence of major shift variables will be reviewed later.

Seasonal f.o.b. Demand for California Fresh Oranges. In analyzing the market demand for oranges, it is advisable to consider winter and summer oranges separately. This type of seasonal distinction is followed for reasons other than convenience. A more important reason is that the winter and summer periods reflect different market characteristics for oranges.

Winter oranges from California are marketed during the six-month period from November through April and comprise mostly navels. Summer oranges from California are marketed during the six-month period from May through October and comprise mostly Valencias. Fresh-orange marketings from Florida, Texas, and Louisiana occur primarily in the period from September through June.

From the view of California shippers, a distinctive difference between the winter and summer seasons is that the winter season has—over the years—included competition from the fresh orange shipments primarily from Florida, and also from Texas and Louisiana. Since California navels are shipped mostly in the winter season, historically, navel growers and shippers have been faced with competitive shipments from other producing states. But Valencia growers and shippers, historically, have been in a different situation. Their shipping period, the summer months, has in large part been free from competitive shipments from other producing states. This contrast between the winter and summer markets,

for a long time, influenced the relative positions of navel and Valencia growers in California. But recent market developments have tended to upset the historical pattern. Before considering such developments and their impacts, however, it is first necessary to look more closely at the demand characteristics of California winter and summer oranges.

Winter Oranges. There are various ways to look at what has happened to the demand for fresh winter oranges and their price elasticity or the responsiveness of consumer purchases to price changes. One convenient and, for our purposes, advantageous way is to consider the prewar period, and then the prewar and postwar years combined. That way, we can note the extent to which the inclusion of the postwar years changes the nature of the results; we shall thus be able to infer the nature of the demand during the postwar years. Analysis of the postwar years alone is not acceptable because they are too few in number to serve, by themselves, as a base for the type of statistical analysis necessary. Yet, the procedure outlined above does yield indications of the developments in demand for winter oranges in the postwar years, and that is essentially what we are interested in here. Before discussing the results of the analyses, we shall indicate the variables or factors considered.

First it may be noted that the analyses explains the behavior of the seasonal f.o.b. prices of winter oranges, in a statistical sense, in terms of the behavior of other influences. These are fresh shipments of California winter oranges, fresh shipments of winter oranges from other producing areas including Florida, and the level of United States nonagricultural income payments. Also included is a "time trend" which reflects the influences of those factors which have changed smoothly and persistently over time during the period.

The price, shipments, and income variables included in the analyses are shown

in figure 21. The f.o.b. prices, which include winter oranges exported in addition to shipments to domestic markets, followed the well-known course of tending to build up to a peak in 1929-30, and then quickly falling during the depression years to a low in 1932-33. Then recovery followed year by year through 1936-37 after which "the 1937 recession" developed and from which recovery again took place. The war years' development is omitted because of its abnormal nature and elements such as price controls and rationing. In the postwar years, beginning with 1945-46, prices in terms of money (not purchasing power) were much higher than immediately before the war. But in the postwar years, the seasonal price movement was irregular and did not follow a consistent trend.

The volume of California fresh shipments of winter oranges varied from season to season. Despite the fluctuations, which were extreme in some years, there was no pronounced trend over the period as a whole. This may be noted by comparing the figure of 13.3 million boxes as the average for the period 1924-25 to 1928-29 with 14.2 million boxes as the average for the period 1945-46 to 1949-50.

Shipments of fresh oranges during the winter season from states other than California have followed a rising trend. In spite of year-to-year fluctuations—and sometimes sharp ones—the long-

term trend has been up. This has reflected in large part the rising trends in acreage and production in Florida explained earlier in the previous section.

The course of nonagricultural income payments reflects the trend and cycle experience in general business conditions. The well-known rise up to the end of the 1920's, the depression years of the early and middle 1930's, the prewar recovery in the late 1930's, and the inflated high money income level years of the latter 1940's are all evident in the index of non-agricultural income payments pictured in figure 21. The income series, as well as the fresh shipments from other states, may be considered as "shift" variables because their fluctuations cause shifts in the demand for California fresh orange shipments. In the same way, the "time trend" is a shift variable expressing how the demand for California fresh orange shipments shifted in response to influences which change smoothly but persistently over time.

We may now turn to the summary results of the statistical analyses of demand characteristics of California fresh winter oranges.* The results support the view that for given levels of income, of supplies from other states and of consumer attitudes, an increase in the shipments and sales of California fresh winter oranges is associated with a decrease in the f.o.b. prices. Increased winter shipments from other states also tend to de-

* The statistical results for California fresh winter oranges may be expressed as follows:

Period 1924-25 to 1941-42;

$$X_1' = 7.152 - 0.6603X_2' - 0.6523X_3' + 1.3092X_4' - 0.0030t - 0.0004t^2$$

(3.69) (3.87) (7.15) (1.25) (2.32)

$$\bar{R} = 0.967; N = 18$$

Period 1924-25 to 1941-42 and 1945-46 to 1949-50;

$$X_1' = 4.131 - 0.5883X_2' - 0.3573X_3' + 1.5030X_4' - 0.0057t - 0.0003t^2$$

(2.66) (1.57) (5.62) (1.81) (1.58)

$$\bar{R} = 0.922; N = 23$$

where primes denote logarithms, figures in parentheses are t-ratios, and

X_1 = f.o.b. price (in dollars per box)

X_2 = California fresh shipments (in boxes)

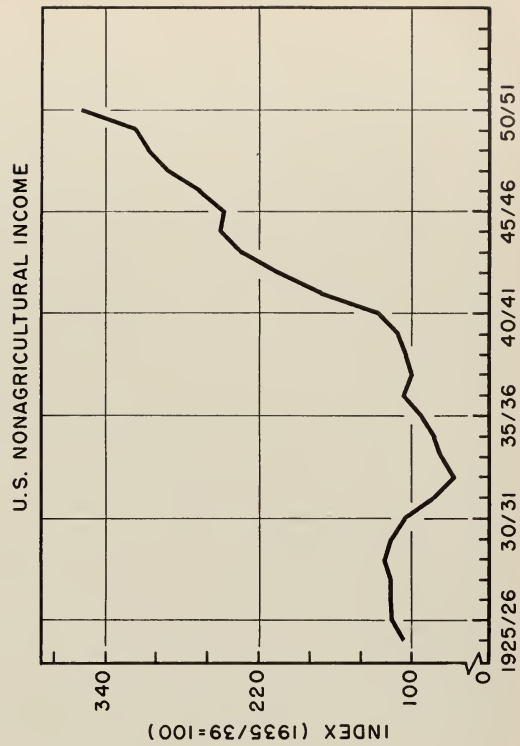
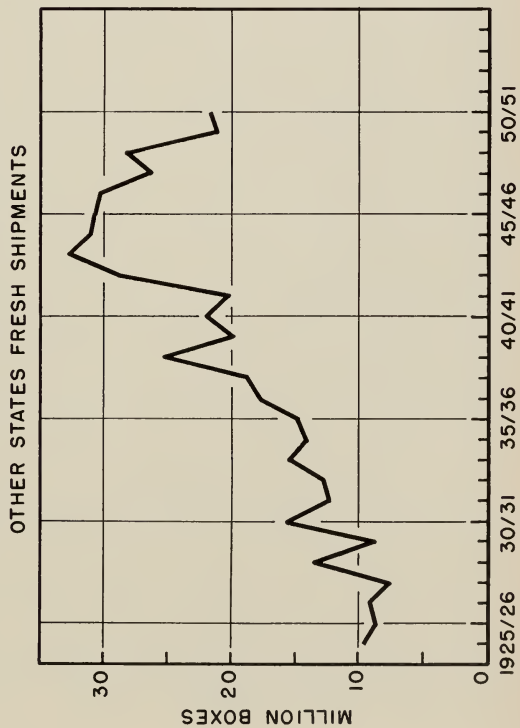
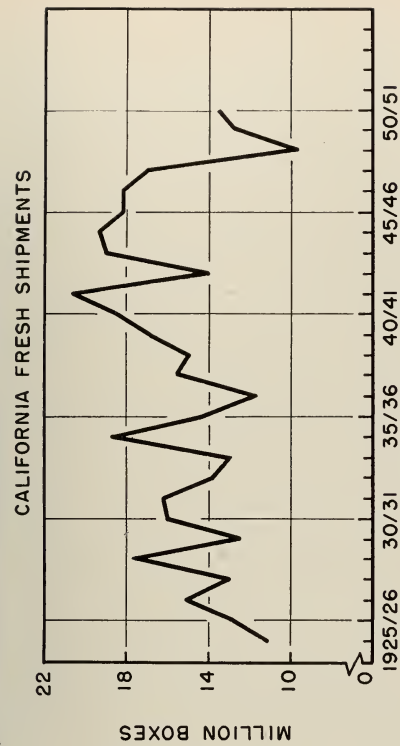
X_3 = fresh shipments from other areas (in boxes)

X_4 = index of U. S. nonagricultural income (1935-39 = 100)

t = time, origin at May 1, 1933, the end of the 1932-33 winter season.

The above statistical results, as well as those for fresh summer oranges to be noted below, were developed with Dr. G. M. Kuznets and with whose cooperation they are cited and used here.

Figure 21. California Fresh Winter Oranges; Seasonal Average f.o.b. Prices and Factors Related to Them, from 1924/25.



press the f.o.b. price of California fresh oranges. Increased levels of income, with other factors given, tend to increase the demand for fresh winter oranges. There is an apparent tendency for the demand for California fresh winter oranges to have tapered off in recent years. This is consistent with the facts that in recent years California fresh winter shipments have been relatively stable, whereas those from other states have increased substantially and money income also increased considerably.

These general tendencies pertain to the prewar years as well as the entire period including the postwar years. But of particular concern to the orange industry are certain changing economic relationships; and of significance at this point is evidence on the changing characteristic of price elasticity or the responsiveness of sales volume to price changes. On this question, the statistical results tend to support the view that during the postwar years the price elasticity of the demand (at the f.o.b. level) for California fresh winter oranges is greater than it was during the prewar years. This is inferred because the price elasticity for the prewar years is less than for the prewar and postwar years combined.

In the recent postwar years and now, the sales volume of California fresh winter oranges appears to be more responsive

to price changes than was the general situation in the prewar years. This changing economic relationship is consistent with other developments including the increased volume of fresh winter shipments from other states as compared with California, and the rapid growth in orange products, especially frozen concentrated orange juice. In fact, one may suspect that the greater responsiveness of sales volume to price changes is associated with the greater availability—in the recent postwar years and now—of more acceptable substitutes or alternatives for fresh oranges. This question and its implications will be considered later.

Summer Oranges. The seasonal behavior of the f.o.b. prices of California fresh summer oranges is related to behavior of California shipments of fresh summer oranges, shipments from other areas in the summer period, and the level of consumers' money income expressed in terms of an index of nonagricultural income. In addition, there is a "time" trend to consider. The behavior over time of the prices and the major factors affecting them is summarized in figure 22.

We may now directly turn to the results of the statistical demand analyses of California fresh summer oranges based on investigation of the influences just mentioned.* The net relation between f.o.b. prices and shipments of California

* The statistical results for California fresh summer oranges may be expressed as follows:

Period 1925-1941;

$$Y_1' = 5.684 - 0.9428Y_2' - 0.1764Y_3' + 1.3394Y_4' + 0.0049t - 0.0028t^2$$

(7.67) (2.35) (6.35) (0.92) (3.48)

$$\bar{R} = 0.965; N = 17$$

Period 1937-1941 and 1946-1950;

$$Y_1' = 2.214 - 0.8346Y_2' - 0.1792Y_3' + 2.4677Y_4' - 0.0421t - 0.0009t^2$$

(2.85) (1.47) (4.36) (3.36) (1.69)

$$\bar{R} = 0.944; N = 10$$

Period 1925-1941 and 1946-1950;

$$Y_1' = 4.957 - 0.9061Y_2' - 0.1580Y_3' + 1.5109Y_4' + 0.0050t - 0.0025t^2$$

(6.61) (1.82) (6.94) (0.83) (4.16)

$$\bar{R} = 0.944; N = 22$$

where primes denote logarithms, figures in parentheses are t-ratios, and

Y_1 = f.o.b. price (in dollars per box)

Y_2 = California fresh shipments (in boxes)

Y_3 = fresh shipments from other areas (in boxes)

Y_4 = index of U. S. nonagricultural income (1935-39 = 100)

t = time, origin at 1933.

fresh summer oranges is such that increases of one are associated with decreases of the other for given levels of shipments from other areas and the income index. And for given levels of California shipments and the income index, an increase of shipments from other areas is associated with a decrease of the California f.o.b. price. As may be expected, advances in the income index are reflected by increased demand for California fresh summer oranges. For California fresh summer oranges, as for winter oranges, the demand at the f.o.b. level appears to have tapered off during the past decade.

Of particular significance is what has happened to the price elasticity or responsiveness of sales to price changes, at the f.o.b. level, in the postwar as compared with the prewar years.

Comparison of the statistical results for the prewar and postwar periods suggests that the price elasticity is greater now than was generally the situation in the prewar years. This means that for given levels of income and shipments from other areas, a certain decrease, say, in the f.o.b. price of California fresh summer oranges, is associated with a greater increase in f.o.b. shipments than was the general case before the war. This greater sensitivity or responsiveness to price changes may well be related to augmented supplies of alternatives such as greater shipments of fresh oranges from other areas and the currently available supplies of orange juice products. But this matter, for both fresh summer and winter oranges, will be considered in the next section of this report. We shall now consider the competitive demand relations among the several major orange juice products.

Consumer Demands for Oranges and Orange Juice Products. The preceding review of statistical demand characteristics was on analyses of seasonal behavior, winter and summer, and was limited to fresh oranges and reflected the

situation at the f.o.b. stage of the marketing flow from producer to consumer.

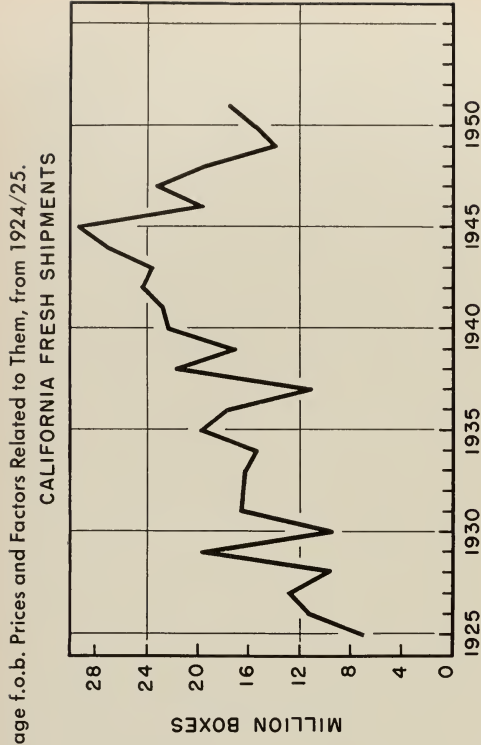
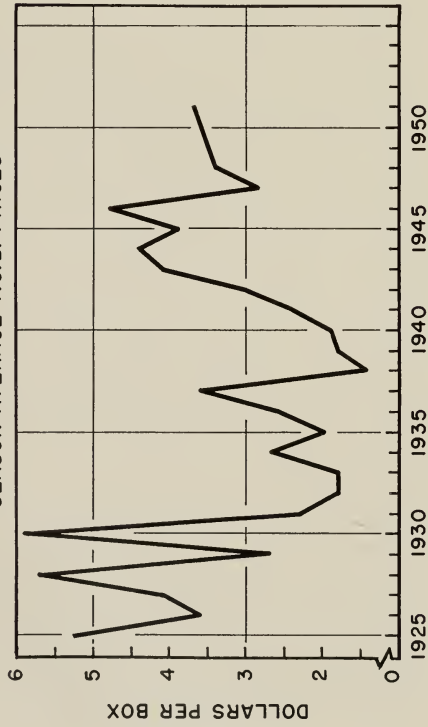
Other views of the situation in the demand for oranges may be obtained by considering different types of data. Beginning with January, 1949, there are available monthly data on retail operations in oranges and orange products. The data reflect retail prices and consumer purchases at retail and are for fresh oranges, for canned single-strength orange juice, and for frozen concentrated orange juice. Such data, for the country at large, are shown in figure 23.

The consumer purchases of fresh oranges, canned single-strength orange juice, and frozen concentrated orange juice have been transformed into juice equivalents in order to have some common bases for comparison of relative volumes as well as trends. This does not mean that juice equivalent, in terms of gallons, is the only or even the most appropriate common unit for comparison purposes. But it is a convenient and, for our purposes, meaningful base for comparison.

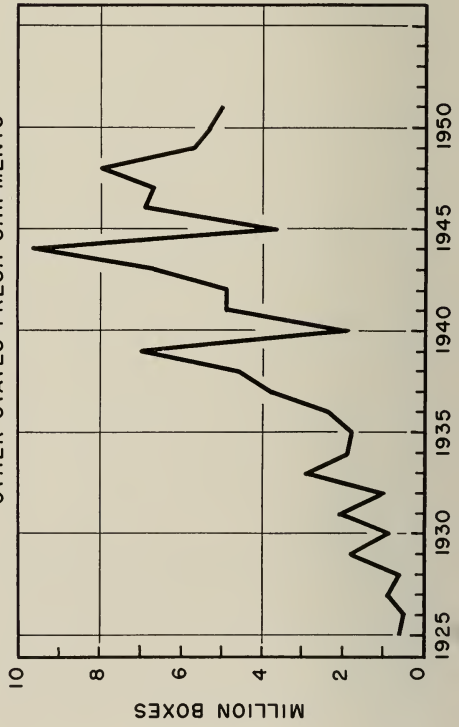
Similarly, the retail prices of fresh oranges, canned single-strength orange juice, and frozen concentrated orange juice have been transformed into a common price unit of dollars per juice-equivalent gallon. Here again, no presumption is made that consumer satisfaction or comparative values of fresh oranges, canned single-strength orange juice, or frozen concentrated orange juice are reflected in their retail price equivalents per juice gallon. But that basis for comparison is meaningful, clearly understood, and convenient for our purposes.

Examination of the upper panel of figure 23 shows the well-known seasonal movement in the consumption of fresh oranges, with the heavier consumption months in the winter season, and the lighter consumption months in the latter part of the summer season. Although the seasonal pattern in fresh orange con-

Figure 22. California Fresh Summer Oranges; Seasonal Average f.o.b. Prices and Factors Related to Them, from 1924/25.
 SEASON AVERAGE F.O.B. PRICES



OTHER STATES FRESH SHIPMENTS



U.S. NONAGRICULTURAL INCOME

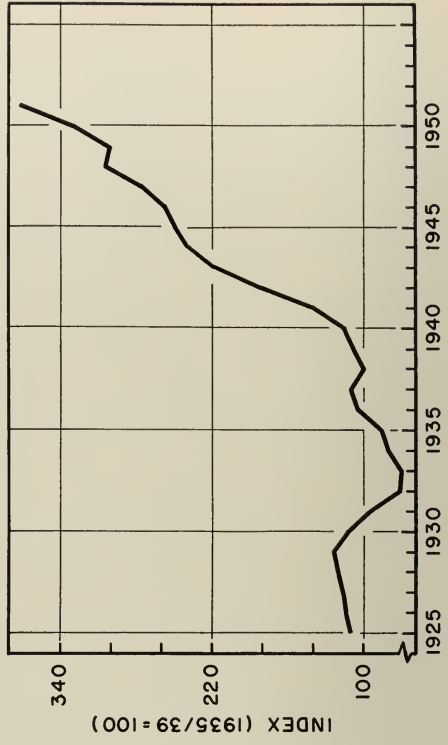
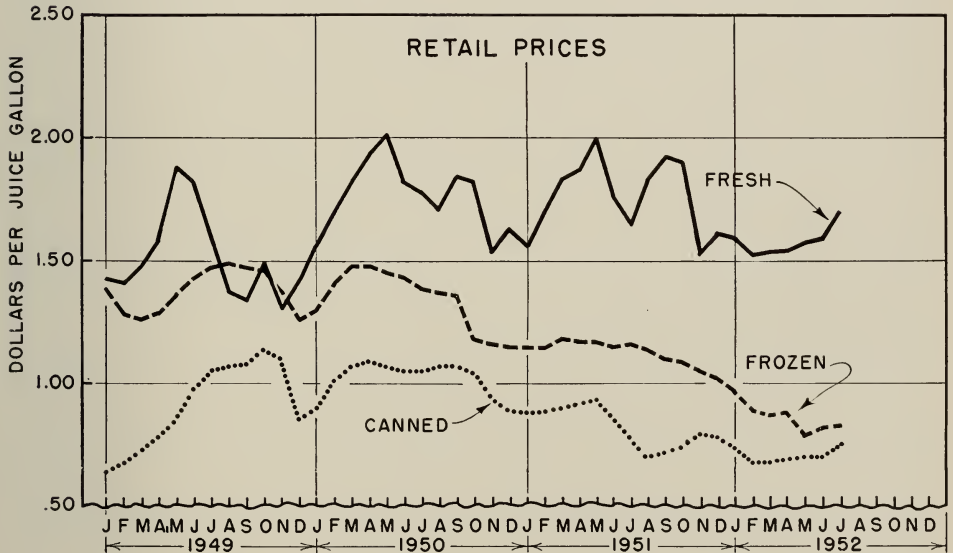
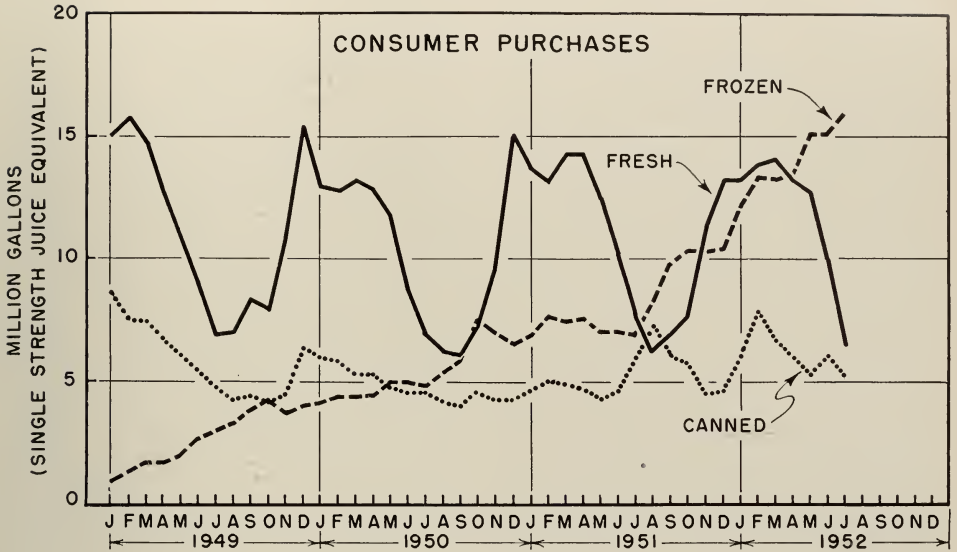


Figure 23. Consumer Purchases and Retail Prices of Oranges and Orange Products, by Months from January, 1949.



sumption varies some from year to year, the seasonal profile is recognizable each year and follows the general form indicated in figure 23. The trend in fresh orange consumption, aside from the seasonal movement, has been just about

horizontal during the past several years. Close examination of the data hints a very slightly declining trend, but it is not strong enough to be significant or meaningful as to future developments.

Consumer purchases of canned single-

strength orange juice since the beginning of 1949 are compared with consumer purchases of fresh oranges in figure 23. The volume of canned orange juice purchased by consumers in 1950 totaled less than in the preceding year, but just about equaled the volume in the following year, 1951. The trend of canned orange juice (single strength) consumption in the past three years has been about level, but is lower than prevailed several years ago. The long-time growth in canned single-strength orange juice is suggested by the summary data shown on page 51.

Although the long-time trend in the pack and sale of canned single-strength orange juice has been striking, a definite tapering off has occurred during the past several years. Some students of the citrus industry believe that the leveling out of canned single-strength orange juice con-

sumption is tied in with growth in the consumption of frozen concentrated orange juice.

Even more remarkable than the growth of canned single-strength orange juice has been the growth of frozen concentrated orange juice. Figure 23 shows the estimated monthly consumer purchases of frozen concentrated orange juice, compared with fresh oranges and canned single-strength orange juice, all in terms of equivalent gallons of juice.* The marked expansion of the frozen concentrated orange juice is evident from the figure and has been viewed as one of the most outstanding marketing-merchandising developments in the food industries. Near the middle of 1950, the retail sales of the frozen concentrate product exceeded in volume, for the first time, the retail sales of the canned single-strength

* The primary data on consumer purchases of fresh oranges, canned single-strength orange juice, and frozen concentrated orange juice are available in terms of boxes, cases of 24/No. 2's equivalent to 432 ounces of juice per case, and gallons, respectively. To place the fresh oranges and the juice products on a common base for comparison, their consumer purchases have been expressed in terms of equivalent gallons of single-strength juice. Such was done by using the following conversions: the fresh oranges, originally in terms of boxes, were converted to a tonnage base by using the factors of 77 pounds per box for California oranges and 90 pounds per box for all other oranges. The pounds of fresh oranges were converted to short tons. The fresh oranges juice-yield factors then used were: for California Valencias, 104 gallons of juice per ton; for California Navels, 85 gallons per ton; and for all other oranges, 110 gallons per ton. Then, giving consideration to the relative volumes of California Navels, California Valencias, and other oranges purchased monthly by consumers since January, 1949, weighted average yields were determined to arrive at equivalent gallons of single-strength juice. Such weighted averages are 100 gallons per ton for fresh oranges marketed during the winter season (November-April) and 106 gallons per ton for fresh oranges marketed during the summer season (May-October). The canned single-strength juice (432 ounces per case of 24/No. 2's) was converted into gallons by use of the factor of 128 ounces per gallon. The frozen concentrated juice (in terms of gallons) was converted by use of the factor of 4 gallons of single-strength equivalent to 1 gallon of concentrate.

The primary data on retail prices of fresh oranges, canned single-strength orange juice, and frozen concentrate are available in terms of cents per dozen, cents per 46-ounce can, and cents per 6-ounce can, respectively. To place the fresh oranges and the juice products on a common base for comparison, their retail prices have been expressed in terms of dollars per equivalent gallon of single-strength juice. Such was done by using the following conversions: for fresh oranges, the price in cents per dozen was converted to dollars per equivalent gallon of single-strength juice by using for winter oranges the factors of 16.6 dozens per box, 84.5 pounds per box, and 100 equivalent gallons of single-strength juice per ton of fresh oranges; and for summer oranges, the factors of 17.6 dozens per box, 80.8 pounds per box, and 106 equivalent gallons of single-strength juice per ton of fresh oranges (these factors are weighted averages reflecting the reported retail purchases of California and Florida oranges for the period beginning January, 1949). For canned single-strength juice, the price in terms of cents per 46-ounce can was converted to dollars per equivalent gallon of single-strength juice by using the factor of 2.78 cans (46 ounces each) per gallon or 128 ounces per gallon. For frozen concentrate, the price in terms of cents per 6-ounce can was converted to dollars per equivalent gallon of single-strength juice by using the factors of 1 can (6 ounces) of concentrate as equivalent to 24 ounces of single-strength juice, or 5.33 cans of concentrate (6 ounces each) as equivalent to 1 gallon of single-strength juice.

product and apparently has retained this position since then. Near the end of the third and early in the fourth quarter of 1950, when fresh oranges were at their seasonal low, sales of the frozen concentrate product exceeded even fresh oranges. A similar situation appears to have occurred at the beginning of the second half of 1951. The strong position acquired by the frozen-concentrate product is clearly evident and in large part reflects changing consumer buying habits and demands; and also bears upon the questions of competitive demand relations between fresh, canned, and frozen concentrate orange juices. But to provide further bases for considering such questions, we need review the price trends at the retail level.

The lower panel of figure 23 shows the monthly retail prices in equivalent juice gallons since the beginning of 1949. Several features of the price development are clear. In terms of dollars per equivalent juice gallon, fresh oranges have been most expensive, followed by frozen concentrate and then canned single strength. Next may be noted that the prices of the canned single strength and frozen concentrate tend to be correlated over time, or tend to stay in line with each other. This relationship is not perfect, but definitely recognizable. Next may be noted that the price of fresh oranges has tended to follow a rising trend, whereas the prices of frozen concentrate have tended to follow a declining trend. The prices of canned natural strength have followed no definite trend over the period. Thus, the general tendency has been for the spread between the fresh orange and processed orange products (canned single strength and frozen concentrate) to widen, and for the spread between the canned single

strength and frozen concentrate to narrow. These are only broad general tendencies, to which there have been important exceptions in some months and groups of months. But they have been tendencies which affect, as well as reflect, important developments in the citrus industries, and will be discussed later.

The above review of near-recent trends in the retail prices and consumer purchases of fresh oranges, canned single-strength orange juice, and frozen concentrated orange juice (in terms of equivalent juice gallons) bear upon the competitive demand relations among the several sources for orange juice. There are many opinions in the citrus industry and trade concerning such relations. Some accept the view that the marked growth in frozen concentrated orange juice has occurred primarily at the expense of canned natural-strength juice; another view is that the fresh-orange market has borne the major brunt of the frozen orange juice concentrate; others lean toward the view that both fresh oranges and canned natural-strength juice have suffered in undeterminable amount; still others agree with that but add that the total market for fresh oranges and orange juice products has expanded.

It may be that market and consumer experience with frozen orange juice concentrate is still too meager to serve as a firm basis for considering demand interrelations among the several orange juice sources; for a refined and definitive analysis, that may well be correct. But suggestive, if inconclusive, analyses may now be attempted. Such has been done by comparing the movements of the available monthly series on retail prices and consumer purchases considered above.*

The findings are consistent with the

* By comparing the relative fluctuations over time in the price ratios and quantity ratios, a suggestion may be gleaned as to the demand interrelations which have tended to develop during the period. If there is a strong tendency for the price ratios to remain at a particular level, compared with a less strong tendency on the part of the quantity ratios, there is the presumption that the two products are competitive in consumer demand and purchase behavior. This means that if two goods are competitive their prices tend "to stay in line with each other" more than if the goods are not competitive; and, if two goods are complements, their quantities tend "to stay in line"

view that in terms of broad general tendencies, competitive demands exist among fresh oranges, frozen concentrated orange juice, and canned single-strength orange juice. This does not mean that such exists for all consumers and to the same extent; on the contrary, important exceptions and many individual differences undoubtedly exist. The result reflects only general broad national tendencies, and they may not be reflected perfectly. It further appears that the recent developments in frozen concentrated orange juice have had a greater impact on the fresh orange markets than did the earlier developments in canned single-strength orange juice. This view will be examined in more detail in the next section of the report. And in anticipation of such considerations, we will now look at certain other evidence bearing upon consumer demands, purchases, and uses of oranges and orange products.

Consumer Uses of Oranges and Orange Juice Products. There are various methods of looking into the attitudes and behavior of consumers with respect to the uses of oranges and orange products. One method is to ask a sample group of households, and such a method was recently used to learn about "Consumers' Use of and Opinions about Citrus Products."* Although the survey pertained to all citrus, it is worth while to quote from its Summary of Findings

with each other more than if the goods are not complementary. These relations are formalized by saying that for two competitive goods, the quantity ratios fluctuate relatively more than do the price ratios; and for two complementary goods, the price ratios fluctuate relatively more than do the quantity ratios. Such a test is only one among several (none completely satisfactory) which have been applied to examine the demand relations among fresh oranges, canned natural-strength orange juice, and frozen concentrated orange juice. The results are summarized in the following table.

Types of orange juice	Coefficients of variation	
	Quantity ratios	Price ratios
	(per cent)	
Fresh oranges and canned single strength.....	28	19
Fresh oranges and canned frozen concentrate.....	40	17
Canned single strength and canned frozen concentrate.....	26	12

The price ratios for products A and B were obtained by dividing the price per unit of A by the price per unit of B; and the corresponding quantity ratios for the same two products A and B were obtained by dividing the number of units of A by the number of units of B.

* U. S. Dept. of Agr. Bureau of Agr. Economics, Agriculture Information Bulletin No. 50. October 1951.

since they bear upon fresh oranges and orange products.

"Use of Citrus Products.—Practically all homemakers had made some use of citrus products during the year that preceded the interviewing. In most instances these homemakers had used at least five different citrus products. The most popular items were:

Fresh	Canned	Frozen
Oranges	Orange juice	Concentrated
Lemons	Grapefruit juice	orange juice
Grapefruit		

"Homemakers with higher family incomes tended to use a greater variety of citrus products. Frequent use (during the winter) of fresh oranges, grapefruit, and lemons, and frozen concentrated orange juice was more characteristic of homemakers with higher family incomes. Frequency of use (during the winter) of the canned citrus products did not appear to be related to family income.

"With the exception of frozen concentrated orange juice a large majority of the homemakers were using the same quantity of a citrus product as they had during the previous year—a rather high proportion of the users of frozen concentrated orange juice had increased the quantity used.

"Attitudes towards citrus products.—Most homemakers regard citrus fruits as representing a special class within the larger category of fruit. The uniqueness of citrus fruits is attributed by the homemakers primarily to their health and food values. Among the various fresh citrus fruits, oranges were thought by them to be highest in food value; fresh citrus fruits, in general, were said to be of better quality than processed citrus items.

"Health and taste characteristics were primary factors involved in either using or not using citrus products. In addition, convenience

and cost factors were influential in the use of the canned products.

"Among homemakers who had used frozen concentrated orange juice this product usually had a preference rating much higher than the canned citrus juices.

"Decision-making in purchasing citrus products.—Decisions as to whether to buy fresh citrus fruit or which one to buy were influenced by the quality of the fruit within the store. The criteria used in judging quality usually were aspects of the skin rather than size, weight, or variety.

"Whereas many homemakers said they usually buy a particular brand of canned citrus juice, they seem to shift, rather readily, to other brands at those times when their preferred brand is not available."

The results of the survey also revealed a general tendency for households to have a higher taste preference for fresh oranges than for frozen concentrated orange juice. But the survey clarified that factors in addition to taste preference—such as relative costs and convenience—also influenced consumer uses and opinions about citrus products.

The above results stem from an opinion survey; they indicate what a sample group of individuals *reported* as their opinions, or *said* what they thought. But another method of examining the situation is to look at what householders do, rather than what they say. This latter method is, in some respects, in the same category as studying market activities, except the activities of sample individuals are noted and summarized rather than market totals. We used the market-total approach above when we considered competitive consumer demand relations among fresh oranges and orange juice products. Now we may turn to the results of a study based on reports of what a sample of householders do in their household operations.

This second orange usage study was conducted in part of the winter of 1950–51.* A panel of almost 3,000 householders were asked to record and report what they actually did with respect to orange

* The survey, "Orange Usage Study," was conducted by Industrial Surveys Company for Sunkist Growers.

usages. The sample of households consisted of some 2,993 families, living in the northeast and north central regions of the country. They reported any purchase of California oranges during the two-month period, December 1950 and January 1951. The sample cannot serve as a firm base for projecting to the country in general, but it can be considered as suggestive of relations and practices which may merit further examination.

This usage study found that the sample group obtained, in terms of equivalent juice units, about half of its orange juice by purchase of fresh oranges (California navel and Florida); and about half from the frozen concentrate and canned single-strength sources. Each of the latter two accounted for about one-quarter of the total orange and orange juice products consumption. This distribution is not fully in line with evidence reflecting the situation for the country at large; but the differences are not unacceptable in view of the fact that the usage survey is based on a two-month period and is for a section of the country.

Another finding of the study throws light on certain consumers' practices. The evidence suggested that in the winter months about two-thirds of the total orange consumption (including fresh oranges and juice products) was in the form of orange juice. Almost 30 per cent of the consumption was in the form of "eating the orange alone," or what is sometimes called "eating out of hand." About 3 per cent of the consumption was in the form of salads, in recipes, etc. These results, especially the orange consumption in the form of juice, are in line with and confirm other evidence.

In reporting the use of winter oranges no distinction so far has been made between California and Florida oranges. But the study also throws some new light on that question. The evidence from the study indicates that California fresh win-

Uses of Fresh Winter Oranges

Type of usage	Fresh winter oranges	
	California navel	Florida
	per cent	
For juice	20	63
By itself	75	31
At home	54	24
In lunch	21	7
In salads, etc.	5	6
	100	100

ter oranges, navels, are used substantially less for juice than Florida fresh winter oranges. The broad distinctions are summarized in the table on this page. On the basis of the tendencies revealed in the above table, householders—at least a substantial majority—tend to use California navel oranges for “eating by themselves”; whereas the Florida fresh winter oranges are used in large part, but not entirely, for juice purposes. To the extent this pattern of consumer behavior prevails, it may have a significant impact on the differential positions of navel and Valencia oranges in California.

The survey also brought out other consumer-behavior aspects. Since a significant proportion (about two-thirds) of total fresh oranges and orange products are used in juice form, it is interesting to know the sources of the orange juice. The survey of winter-orange usage indicated the following percentage distribution of orange juice from the various sources: from fresh navels, 8 per cent; from fresh Florida’s, 17 per cent; from other fresh oranges, 4 per cent; from frozen concentrate, 36 per cent; and from canned single-strength, 35 per cent. These results mean that despite the relatively recent advent of frozen concentrate, it has become a leading source of orange

juice. The results also emphasize the relatively minor position of California navels as a source of orange juice in the winter. But when fresh winter oranges “eaten by themselves” are considered, the results are as follows: California navels make up almost 70 per cent of the total; Florida’s almost 20 per cent, and others, unclassified, as the remainder. It is clear that the strong position of California navels is in their use for “eating by themselves” and not for juice. These results help evaluate the impact on the fresh orange market resulting from the development of frozen concentrated orange juice.

It is important to emphasize at this point that these results of orange usage can be considered only preliminary. They reflect experience of only part of one winter season, and they are based on a sample which consists of only those families in the northeast and central regions who reported any purchase of California oranges during December 1950 and January 1951. Yet, the results of the survey are reasonably consistent with other evidence on market developments in fresh oranges and orange juice products. And when viewed as indications rather than conclusions, the results are suggestive and informative—at least while additional experience and information are accumulated.

CHANGING ECONOMIC RELATIONSHIPS

In the two previous sections we have outlined some major developments which have occurred in the orange industries. Our objective was to set forth the trends in production, acreage, utilization, costs and returns, and in shifts among demands and uses.

Now we may consider the impacts of those developments and interpret them in terms of their effects and repercussions. To see the over-all picture, we shall draw upon points noted or developed earlier, and at times supplement them with other points. It will be necessary to consider the orange industry at large, rather than in terms of detail for particular districts or counties; therefore, individual production-marketing groups must interpret their own position from the over-all industry situation considered in this report.

Major Shifts in Production-Marketing

The production of oranges in the United States averaged about 110 million boxes during the past five years. This represents an increase of about 70 per cent over the five-year prewar average of about 64 million boxes. Most of this huge increase in orange production took place in Florida. Production in California remained about the same.

Along with the production changes from the prewar to the postwar years, certain marketing changes have occurred. Before World War II, about 95 per cent of the Florida oranges harvested were shipped for fresh consumption. In the past year or two, only about a third of the Florida oranges harvested were shipped for fresh consumption. This reflects a large proportion of the Florida crop going into frozen concentrate and canned single-strength juice.

In California, too, certain shifts and changes have developed. But they are not wholly comparable or similar to those in Florida. In California, the processing of

frozen concentrated orange juice began later than in Florida and has not yet grown to the same extent.

As noted in a previous section, Valencias make up about 60 per cent of California orange production. These Valencias are summer oranges; they are primarily a "juice orange," and when shipped for fresh consumption, they reach the markets when Florida fresh shipments are at their seasonal low. Navels account for about 40 per cent of the California-Arizona orange production; they are a winter orange, and they are not best adaptable for processing as a source of canned single-strength or frozen concentrated orange juice.

A decade ago, only about 15 per cent of the California-Arizona Valencia crop was processed; last year almost 40 per cent was processed, most of which went into frozen concentrate. But navels still are used primarily for fresh shipping.

These shifts in production-marketing—which were outlined in some detail in the earlier sections of this report—occurred along with certain technological developments. Since these technological developments made for significant shifts in the orange industry, it is necessary to note what is involved.

Frozen Concentrated Orange Juice. Beginning in the early 1930's, the frozen food industries began to develop, and they did so rapidly. Packs and sales of fresh frozen fruits and vegetables, fish, meats, and berries increased. Improved methods of packing fresh frozen foods were introduced, and distribution facilities were improved and expanded. More and more retail outlets invested in low-temperature sales cabinets, and by the late 1930's and early 1940's fresh frozen foods were no longer a novelty; their production and distribution were established and it was clear that the consuming public had accepted them. The housewife had become used to

the availability of fresh frozen foods and expected their display and sale in the retail outlets. Sales expanded, prices went down, and quality improved.

These two developments, the public acceptance of fresh frozen foods and the ready existence or availability of low-temperature cabinets in most retail food outlets by the middle 1940's, went hand in hand. They subsequently had a marked impact on the orange industries. Of importance also was the fact that facilities were available in most homes to store frozen concentrate: for limited periods in refrigerators; and for longer periods as low-temperature home cabinets or "deep freezers" became more widely distributed.

Various interests in the citrus industries had for some years been looking for means of producing or manufacturing a processed orange juice which would come closer to home-prepared orange juice squeezed from the fresh fruit. In terms of taste and aroma, canned single-strength orange juice did not meet those desires. A high-vacuum, low-temperature evaporation process yielding a nonpasteurized product, frozen concentrated orange juice, became available in 1945. Commercial operations began in the 1945-46 marketing year, and consumer acceptance was highly favorable.

The rapid growth in the production and sale of frozen concentrated orange juice has few, if any, equals in the food industry in recent years. Florida's pack was more than 10 million gallons by 1948-49, and more than doubled the next year. The growth in Florida continued, and in 1950-51 almost 31 million gallons were packed using more than a third of total Florida marketings of oranges. In California, commercial output began in the summer of 1948, reached almost 3.5 million gallons in 1949-50, and increased again the following year to over 4 million gallons. And it is still growing.

Why frozen concentrated orange juice

has taken such a hold and has grown so fast is reasonably well clear. The consuming public and retail merchants were used to and had already accepted the idea of frozen foods. A distribution system, developed for frozen foods, and low-temperature cabinets in retail stores were available for use. National employment and income were increasing, and the public's purchasing power was at record levels. As the result of advertising over a period of years, the public had learned to "drink oranges." People were orange-juice conscious, in fact juice conscious, as evidenced by the rapid growth in the sale and consumption of other fruit juices as pineapple juice and also tomato juice. All these factors contributed to setting the stage for the marked growth in the use of frozen concentrated orange juice. But those factors alone cannot fully explain the situation. Another one, and a very important one, must be included, and that is the quality factor.

For a number of years, consumers had available a canned single-strength orange juice. Its sale grew considerably before the war. But canned single-strength orange juice did not quite meet the taste and texture characteristics of fresh orange juice; hence, it did not enjoy the consumer acceptance gained by frozen concentrate. The newer product approximated more closely the juice squeezed from fresh oranges. In fact, the newer product had certain advantages with respect to quality control and standards. The solids content and sugar-acid ratio of frozen concentrate can be controlled to a considerable degree; differences in solids content of juice from various lots of fresh oranges can be minimized in the processing, and differences in the sugar-acid ratio of various lots of fresh oranges can similarly be minimized. This aids in maintaining standards and quality.

But it is not to be inferred that frozen concentrated orange juice must or always does attain a high quality standard. In fact, there are wide quality variations in

the various brands marketed. And it is only the higher quality packs which approximate the taste, flavor, and body characteristics of juice squeezed from fresh oranges.

Canned Single-Strength Orange Juice. Although it has been overshadowed in the past several years by the remarkable growth in frozen concentrated orange juice, the development in canned single-strength orange juice was in itself spectacular. The canning of single-strength orange juice began about twenty-five years ago, but the pack did not reach noticeable amounts until the latter half of the 1930's. In the early years of the pack, its quality in terms of taste and flavor was not widely accepted. But gradually, through research and development and the use of better fruit, the quality of the pack improved. By the late 1930's, a variation of the flash pasteurization technique was widely used, and a canned juice with greater consumer appeal and acceptance became available. The pack and market expanded; the pack expanded because increased orange production in Florida was being channeled in considerable part

to the canned single-strength outlet, and the market expanded because the quality of the product was improving, and the consumer price became more and more attractive. In fact, canned single-strength orange juice made up an increasing proportion of the total orange usage year after year, until the frozen concentrated orange juice reached general distribution.

The marketing year 1935-36 was the first time that the national pack of canned single-strength orange juice reached a million cases (24 No. 2 basis), and then the large bulk of the pack was in California. But after that, the situation changed quickly. By the time we entered World War II, 4.8 million cases were packed, with almost three-fourths of the pack in Florida. Purchases by the government for the armed services and for lend-lease shipments to foreign countries loomed large in the war years. But after the war, production expanded to a peak of 27.3 million cases in 1947-48, with almost all (25.6 million cases) being packed in Florida. In addition, Florida that year packed some 12 million cases of blended orange and grapefruit juice.

U. S. Pack of Canned Single Strength Orange Juice

Period	California	Florida	Total U. S.
	(mill. cases 24 No. 2's)		
Five-Year Averages			
1929-30 to 1933-34 . . . . .	. . .	0.1	0.1
1934-35 to 1938-39	0.6	0.5	1.1
1939-40 to 1943-44	1.0	18.4	20.9
Crop Year (Nov.-Oct.)			
1943-44	1.4	7.1	8.5
1944-45	2.9	13.9	16.8
1945-46	3.7	18.4	22.2
1946-47	2.3	17.3	19.7
1947-48	1.5	25.6	27.3
1948-49	2.2	16.8	19.3
1949-50	1.9	17.4	19.5
1950-51	1.6	20.0	22.5

In the past year or two, the national pack of canned single-strength orange juice has been near 20 million cases—only about 2 million in California, and the rest in Florida.

The canned single-strength orange juice market did not develop as a significant outlet for California oranges. This is of importance because of the light it may throw on the newer developments occurring in the frozen concentrated orange juice industry. The canned single-strength orange juice market developed rapidly, and primarily on a price basis. Although the quality of the pack, with fresh juice as a standard, had improved, the canned product was still largely a distinct product. Very substantial price differences were necessary to attract consumers away from fresh oranges. Hence, the returns to California growers from the oranges going to the canned single-strength outlet were unattractive, and that market was used only as an outlet for that fruit which did not pay to be shipped fresh.

Hot Concentrate. This product differs from canned single-strength orange juice in processing technique. The process involves the evaporation of fresh orange juice under vacuum. The degree of concentration attained varies from 42 to 65 degrees Brix* depending upon the market and usage for which the product is manufactured. Pasteurization of the concentrated juice is usually preceded by deaeration to prevent oxidation. This process is commonly called "hot pack" or "hot concentrate" to distinguish it from the "frozen concentrate."

For consumption use, "hot concentrate" orange juice is reconstituted so as to approximate the liquid characteristics of fresh juice. The armed services' requirements stimulated the output of "hot concentrate" orange juice in the war years because of its advantages in saving shipping space as compared with canned single-strength juice. Partly for this rea-

son also, "hot concentrate" has been purchased by the United States Department of Agriculture for distribution to schools in the school-lunch program.

Although of minor importance in the national picture—compared with fresh oranges, canned single-strength orange juice, or the frozen concentrate—in California the output of "hot concentrate" so far has been greater than in Florida. The packs in California and Florida are shown in the table on page 53.

In addition to the "hot concentrate," the orange industry produces what is often referred to as "beverage base," a formula product made from concentrated orange juice. This product is frequently used to impart an orange flavor in manufactured products such as carbonated and noncarbonated fruit drinks, canned orangeades, and in some candies and bakery items.

Changing Attitudes of Consumers.

The preceding sketch of the impacts of technology on the orange industries through the development of canned single-strength, "hot concentrate," and frozen concentrate orange juice markets leads to consideration of changing economic relationships of great importance. That is, the demand attitudes of consumers. To say that "consumers are fickle" is not to give the proper meaning or interpretation to what has occurred. To say that consumer tastes and attitudes are not rigid is to put the matter more appropriately.

Within a period of 10 or 15 years a large part of the public learned to "drink oranges." Inexpensive and effective home reamers became a standard piece of equipment in many kitchens. The public took hold and bought more oranges. But in their drinking of orange juice they were not permanently wedded to juice they squeezed from fresh oranges. Some shift developed to the canned single-strength juice as it improved in quality and became price-attractive. And in the

* Degrees Brix refers to the percentage of dissolved solids in a given weight of juice.

U. S. Pack of Orange Juice Concentrate (65° Brix)

Marketing year	California	Florida
	1,000 gallons	
1940-41	798	65
1941-42	2,226	93
1942-43	3,076	1,882
1943-44	1,926	1,283
1944-45	2,601	240
1945-46	938	244
1946-47	3,332	1,447
1947-48	2,928	1,739
1948-49	2,769	1,898
1949-50	3,216	1,529
1950-51	3,251	2,529

postwar years, another shift began—to frozen concentrate. The recent growth in the frozen concentrate occurred at the expense of both the home use of fresh oranges and canned single-strength orange juice. And the situation now is one of competition in consumption, not for all, but for many orange consumers. Further changes in the relative volumes of oranges used in the fresh, canned, and frozen outlets will depend in large part—but not entirely—on the relative price trends.

The experience of this country—not only in oranges but in many items—is that innovation, change, and new products are taken up quickly by the public. But newness is not sufficient if volume is to be attained; the product must also be price-attractive to the consumer. And in the case of frozen concentrated orange juice, not only was it a new product, convenient to use and attractive in price compared with fresh oranges, but the product was good. For the first time there was available a processed orange juice that reasonably well approximated fresh orange juice. Frozen concentrated orange juice had the relative advantages of quality, price, and convenience.

What is the lesson one may learn? Is

it that the sales of fresh oranges will continue to be subject to competitive pressure from orange juice products? Is it that expanded consumption of oranges will mean eating fewer fresh oranges in favor of more orange juice products? The important lesson to be learned is neither; it is that further change can be expected and will bring along further changing economic relationships.

The consuming public is no more wed to frozen concentrate than it was to fresh oranges or to canned single-strength orange juice. If, or when, a still different orange juice product—which is satisfactory in taste, price, and in nutrition—comes along, the public may well turn to it. This is important for a consideration of changing economic relationships because there are certain distribution problems connected with frozen concentrate. The fact that the product must be kept frozen until used, and low-temperature transportation and storage facilities must be provided, increases the costs of the product.

Current experiments and developments in food technology may well bring forth a canned single-strength orange juice, or a “hot concentrate” orange juice, or even an orange powder which would

yield a product approximating fresh juice in taste and body as much as does the present frozen concentrate. If, or when, such nonfrozen orange juice products are developed so they can be marketed at a price-competitive level, they may have profound impacts on the orange industries. And the frozen orange juice industry would be only another milestone along the path of technological marketing developments. Hence, the future of frozen concentrated orange juice is not necessarily the same as the future of the orange industries. The development of, say, a shelf-stock orange concentrate or an orange powder for reconstituting into orange juice—acceptable in price and taste characteristics—could have even greater repercussions than did frozen concentrated orange juice. This means that technological change and associated changing economic relationships are an ever-present part of the production-marketing scene.

Production for Fresh Shipment and Processing. Technological developments have not only resulted in changing economic relationships in consumption and use practices, but certain production-marketing practices have also changed.

The growth in canned single-strength orange juice and later in frozen concentrated orange juice brought along with it changes in production practices. In Florida, many groves produce only for the orange products market. This means the fruit can be hauled directly from the grove to the processing plant, cannery, or freezing plant. The packing house is eliminated for such fruit. But in California, practically no oranges are produced with processing as the objective in view. In California, almost all oranges are hauled from the grove to the packing house. There, fruit is graded and sized, and then distributed to fresh or processed outlets. This generally involves an extra handling for that fruit which eventually goes to processing. But under the

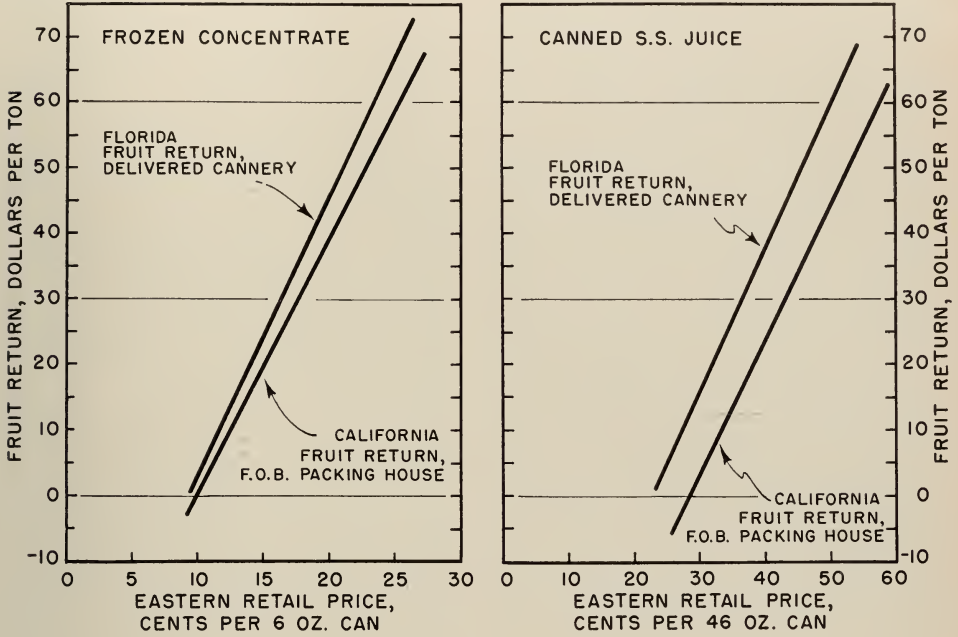
cost-returns levels faced by California producers, they have not been able to produce only for processed outlets. This may be indicated by reference to conditions prevailing in the 1951 season.

Figure 24 shows the approximate relations which prevailed in 1951 between retail prices and returns to growers for oranges used in frozen concentrate or single-strength canned juice. The cost levels existing in 1951 need not represent the situation in later years, but the figure emphasizes certain relations which can be considered generally typical. Although the retail price for frozen concentrate or canned single-strength juice may vary within wide limits, the corresponding returns for the fruit used in the products is higher for Florida growers than for California growers. This should not be unexpected. In an earlier section of this report we have shown that Florida production-marketing costs total less than do those for California growers, and figure 24 is based on the assumption that the eastern retail prices for frozen concentrate or canned single-strength orange juice are identical for California and Florida fruit. Hence, the results are higher returns to the Florida grower of oranges used in frozen concentrate or canned single-strength juice.

The implications of these price-returns relations may be suggested in some examples. In December 1951, the reported national average retail price for frozen orange concentrate was 19 cents per 6-ounce can. Based on the 1951 cost conditions, the 19 cents retail price was equivalent to a return of about \$35.00 per ton for the California grower's fruit used in the frozen concentrate, and a return of about \$41.00 per ton for the Florida grower.

When canned single-strength orange juice is considered, corresponding relations between retail price and grower's return may also be approximated as shown in figure 24. As an example, the national average retail price of canned

Figure 24. Approximate Returns for California and Florida Oranges Used in Frozen Concentrate and Canned Single-Strength Orange Juice, at Various Retail Prices (Reflecting 1951/52 Season Conditions).



single-strength orange juice was 28 cents (per 46-ounce can) in December 1951. With the 1951 cost conditions, the 28 cents retail price was equivalent to about \$12.00 per ton as a return to the Florida grower, but just under breaking even (at the f.o.b. packing house level) for the California grower whose fruit was used to make the canned single-strength orange juice. This means that when cultural costs are considered, and picking and hauling to the packing house are also figured in, the California grower is charged with a net loss for that particular fruit.

These examples, however, cannot be applied to all the oranges produced. First, all oranges are not canned or made into frozen concentrate; and second, the retail prices and grower returns reflect the interaction of conditions not only in the canned single-strength and frozen concentrate markets, but also in the fresh orange markets. Also, unit costs vary with the respective volumes in the several

outlets. But it is clear that because of the lower cost structure facing Florida grower-marketers, they receive a higher return per ton if their fruit retails at the same price as California fruit. It is also clear that at the current and recent price-cost relationships California growers receive a much higher unit return for oranges used in frozen concentrate than for oranges used in canned single-strength orange juice.

The cost structure facing Florida growers for a long time has been lower than that facing California growers. California orange growers have always had to irrigate while water costs exist to a very minor degree for Florida producers. Taxes and labor wage rates have, over the years, been considerably higher in California than in Florida. Yet, despite higher costs, California growers and distributors had generally been able to operate profitably. The major explanation is that the bulk of California oranges was shipped fresh, and on the fresh market

California oranges have over the years received higher prices per box than Florida oranges. On a per-pound basis, the price differential was even larger in favor of California since the Florida box weighs about 90 pounds compared with 77 pounds for the California box.

The market demand for fresh California oranges was greater than for fresh Florida oranges as evidenced by the "premium" differential the trade has been willing to pay for California fresh oranges. This differential reflected the attitudes and opinions of many consumers. They preferred California fresh oranges to Florida fresh oranges and have been willing to substantiate such preferences by paying a premium for fresh California oranges. Recognition of this premium is necessary to have a meaningful account of the changing economic relationships in the orange industries with the advent of frozen concentrated orange juice.

With the appearance and growth of orange products, especially the frozen concentrated orange juice, the premium for California oranges did not carry over into the concentrate. The retail consumer trade did not have, nor was it beginning to develop, preferences for frozen concentrate made from California oranges. At the retail level no special or entrenched preference existed. Frozen concentrated orange juice made from California oranges found itself in a position where it had to compete on a price basis, without the existence of an established preferential demand for the California product.

At the packing house or processing plant level, California growers are paid for their oranges going into frozen concentrate according to solids content of the fruit. The solids content reflects the quantity of sugar and acid in the fruit. The Brix method of analysis commonly used measures the per cent of dissolved solids, by weight, in the orange juice. In accordance with present standards, frozen

concentrated orange juice is concentrated down to a minimum of 42° Brix or 42 per cent fruit solids. Thus, the solids content of the oranges determines the quantity of juice required to yield a gallon of concentrate for freezing.

Color, size, skin condition, and other appearance-affecting factors have no special significance if the fruit goes to making frozen concentrate. The concept of external quality which many growers and shipping organizations have developed over the years and which still are relevant for fruit shipped, sold, and used fresh now do not apply to fruit destined for processing into concentrate.

Prior to the time frozen concentrate acquired a position of prominence, California growers benefited from the premium differential commanded by their fresh oranges in eastern markets. Although such premiums still exist, the volume of fresh fruit business has declined; frozen concentrate has grown in volume, and for the fruit processed, the California grower receives no premium compared with the Florida grower. This is another scene in the panorama of changing economic relationships.

We have noted that California and Florida frozen concentrates retail at the same price for comparable quality labels. We also noted earlier that production costs per ton of fruit are much higher for California growers than for Florida growers. Thus, the juice-products returns to California growers would have to be considerably higher per ton than to Florida growers to yield the same net income per ton of fruit to growers in each state. But such has not been the case. Net incomes from juice products have been much higher for Florida growers. Competition among Florida processors and fresh shippers for the fruit resulted in higher prices to the growers in that state; at the same time they enjoyed cost savings through direct hauling from grove to processing plant. Neither of these advantages existed for California growers.

Thus, the Florida growers benefited much more than California growers from the introduction of frozen concentrated orange juice.

Competition among processors and fresh shippers in California has not been as keen as in Florida. Processors in Florida went into the manufacture of frozen concentrate early and in a big way. In California, processors were hesitant about frozen concentrate and went into the manufacture of the new product in a way significant at all only in the past year or two. In California many in the orange industry believed that their interests were oriented in the direction of the fresh market. Also, processors in California each season were aware of the frozen concentrate pack which had earlier in the season been packed in Florida and such packs and inventories grew each year. In view of such a situation, processors in California had difficulty in obtaining financial backing, and under declining market price conditions they could not pay California growers more for the fruit than the currently declining price seemed to justify. Faced with such alternatives, California growers preferred the fresh market which from their view promised higher returns than the processed market.

While explaining the differential returns to California and Florida growers from juice products oranges, it must be noted that oranges may not indiscriminately be sent to juice manufacture. For use in canned single-strength juice, quality is important calling for adequate sugar-acid ratio and Brix. For use in concentrate, soluble solids are also important. In some years considerable volumes of California Valencias are not best suited for use in frozen concentrate, and in most years the early Valencias and most of the Valencias picked before the middle of July cannot be advantageously used in the manufacture of single-strength juice or frozen concentrate. Navels are not suited for juice manufacture.

Thus, it is clear that although the frozen concentrate orange juice product has opened new potentialities, it has also faced the California orange grower with new marketing complexities. The quality standards for fresh shipment and frozen concentrate are different, and in the latter outlet he does not receive the premium differential to which he has become accustomed from the fresh shipment outlet. Thus, the California grower lost a good deal of his earlier advantage and faced a decrease in net returns. In considering the causes for the new and incompletely understood situation, many growers understandably looked at their marketing practices and institutions. And, although the technological developments coupled with changing consumer demands were basic, many growers attributed their situation to other influences. One of these was the activities of the California Orange Volume Prorate operated by the Orange Administrative Committee.

California Fresh Shipment Prorate. Some growers and shippers in California recognized that the development and growth of orange products, especially frozen concentrated orange juice, was related to their current price-income problems. It is true that the marketing of frozen concentrate had adversely affected many California orange growers, but price-income problems existed earlier.

It was in response to calls for improving the price-income position of orange growers that various types of marketing agreements were introduced. First, voluntary programs were used, and later federal statutory programs under the jurisdiction of the United States Department of Agriculture were established in California; these programs were for shipments to the fresh markets. The most recent federal program was terminated effective March 8, 1952.

The program was administered by an Orange Administrative Committee in the name of the Secretary of Agriculture. The

committee included six grower members from the several producing districts, four handler members, and a representative for the public. The committee met regularly, usually weekly, and set for the following week a shipping quota for each of the producing-shipping districts. Each district's quota was distributed among the various shippers on a proportionate basis in relation to the total crop.

The major objective of the committee in its operation of the program—often referred to as the “prorate”—was to increase grower returns. In order to attain the objective, one of the procedures was to eliminate sporadic excesses and deficiencies in weekly shipments “to smooth out” shipments and “make for orderly marketing.” The thought behind the program was that an evening out of weekly shipments would tend to smooth the price, and in the meantime, returns to shippers and producers would increase higher than they would have otherwise. Many in the fresh shipping trade believe that “orderly marketing” in the sense of smoothing out weekly shipments develops trade confidence and has a favorable effect on demand.

The committee also used another procedure in its attempt to increase returns to growers. Rather than permitting total fresh shipments over the season to equal the amount shippers might desire to market, the committee by setting prorates also restricted the total seasonal shipments. Such restriction was made with the view of raising the season average price and thereby increasing seasonal total returns. The extent to which total grower returns were in fact increased, depended on the extent to which the demand at the grower level was inelastic—whether the percentage increase in price was greater than the percentage decrease in shipments. The evidence indicates that the demand for fresh oranges in the past

several years is less inelastic than it was during the prewar years;* this in turn suggests that the income-raising effectiveness of restricting the seasonal supply of fresh shipments is now less marked than in the prewar years. In addition to regulating shipments from week to week, and over the season as a whole—which is referred to as volume regulation—the committee was also in a position to use size regulations to control the shipment of various sizes such as very small oranges which were believed to depress the market price.

The committee dealt directly with the regulation of fresh shipments. The federal legislation which authorized the committee and its operations† was written in terms of fresh shipments, yet the committee indirectly was concerned with and affected returns from the whole crop. The regulation of fresh shipments meant that the part of the annual crop not shipped fresh went to processing. Thus, in fact, the committee's operations bore upon the following major regulatory questions:

1. Out of an available total crop, how much should be marketed fresh, and how much sent to products?

2. Out of the seasonal total to be sent to fresh market, what should be the weekly distribution of shipments?

3. Out of the seasonal total to fresh market, what should be the distribution of sizes?

These three major questions are inter-related. An ideal solution—in terms of obtaining maximum returns to growers—involved simultaneous consideration of the several questions. This is noted here to suggest the type of difficult assignment with which the committee was charged. And there was yet another consideration which merited attention—the short-run effects of regulation in contrast with the long-run effects. In view of the difficult problems facing the committee and the

* For some evidence on this point see pages 37-41.

† Order 66, As Amended, United States Department of Agriculture. Production and Marketing Administration. T7, Ch. IX, Code of Fed. Regs. Marketing Orders—Part 966.

diverse interests within the orange industries, it is not surprising that the committee was criticized, especially during the past several years.

Some criticisms held the view that the unfavorable returns experienced by certain growers were due to "incorrect prorates" set by the committee. The interpretation of "incorrect" varied from over-shipment to undershipment, depending upon the district concerned and who was making the charge. The distinction between prorating a given supply over the season and varying the seasonal supply was not often clearly made, and frequently the committee was criticized for market developments beyond its control. This was more pronounced since the appearance of frozen concentrated orange juice, and there was in some quarters the view that the weekly proration activities should have been eliminated. In most part, however, the criticisms of the committee largely resulted from a misunderstanding as to what were the committee's responsibilities, and what it could do and what it could not do effectively.

When prorate activities with respect to fresh shipments were initiated in the 1930's, the production-marketing situation in oranges was much different from now. The production then was much smaller, and there were no products which competed significantly with fresh oranges. The committee, during the navel season, could influence the market more than now. A change of, say, 100 cars in the shipment of navels had a larger impact on market price then than now. California navels were a relatively larger segment of the winter market because Florida production and fresh shipments were not at the levels attained later. The committee, during the Valencia season, could influence the market to a great extent because California Valencias dominated the summer market. These types of situations encouraged pressures on the committee more and more to shift its operations from smoothing the weekly

shipments of a given seasonal supply to restricting the seasonal supply with the unshipped volume indirectly being allocated to products outlets. In the prewar years, and from the view of the state as a whole, such operations had advantages in the sense that industry returns were probably increased.

In the recent postwar years, however, a new situation developed. Certain Valencia growers and shippers experienced returns relatively lower than in previous years. Some of the growers believed that their lower returns were due to the prorate activities of the Orange Administrative Committee. To the extent that the committee activities resulted in the crop of certain growers going to products, such criticism was valid from the view of those growers if not from the view of returns for the state as a whole. But the essential point is that the postwar situation was different in certain important respects from that in earlier years, and the difference was not due to the Orange Administrative Committee.

As emphasized before, the demand situation is different now from the prewar years. One result is that the prorate activities of the committee have different effects as compared to the earlier years. In the Valencia summer season, instead of dominating the market as in earlier years, California oranges must compete with frozen concentrate which for many consumers approximates very well the qualities of juice from home-squeezed fresh fruit. This means that if the committee restricts Valencia shipments and raises the market delivered and f.o.b. price, two results follow: consumers are encouraged even more to shift to frozen concentrate, and the Valencias not shipped are in effect channeled to products, the returns of which are not attractive to producers. This latter result occurred to some extent in the prewar years but it was then in large part offset by the fact that shipment restriction had a greater effect on price than it does now. The evidence on this

point was noted earlier when it was indicated that the demand is more elastic now than in the prewar years. This increase in price-elasticity may be expected as it is consistent with the increase and greater availability of closer substitutes for fresh oranges. The relative decrease in Valencia returns in the past year or two has been due to the new market developments, including frozen concentrate, rather than the activities of the Orange Administrative Committee.

So far we have been concerned with Valencias. With navels, the situation is still different. First, California navel growers and shippers have long been accustomed to competition from Florida fresh shipments in the winter marketing season. Hence, the growth of frozen concentrate was not so much a new competitive factor as it was for Valencias. In addition, navels are purchased largely for eating as oranges rather than to be squeezed for juice,* so the appearance of frozen concentrate did not have the impact on navels that it had on California Valencias. Prorate activities of the Orange Administrative Committee with respect to navels remain more meaningful than for Valencias, because the navel situation has changed relatively less than the Valencia situation. This may be taken to mean that the changing differential returns from Valencias and navels are due more to the changing market situations than to the Orange Administrative Committee and its prorate activities.

The activities of the Orange Administrative Committee may further be considered in respect to the setting of the weekly prorate shipment quantities. The activities of the committee included among their objectives one referred to as "orderly marketing." What was meant by "orderly marketing," however, was not always clear. Does it mean keeping daily or weekly prices stable over time during the season? Does it mean having stable weekly shipments during the sea-

son? Does it mean regulating weekly shipments so trade confidence will be maintained? Does it mean getting stable money returns, by weeks or months, during the season? Does it mean having a schedule of shipments during the season so that the seasonal total returns are at a maximum? Or, does it refer to minimizing the season-to-season differences among total seasonal shipments, among season average prices, or among season total returns? All of these meanings, and others too, have been suggested by various people at various times. But whatever the context in which the phrase "orderly marketing" has been used, there has usually been the notion of dampening, if not eliminating, wide fluctuations.

A degree of stability in the movement of shipments and prices over time has generally been taken to be symptomatic of "orderly marketing." Sometimes the "stability" has been thought of in connection with shipments or the flow of supplies to market; at other times, the "stability" has been thought of in connection with market prices or returns. Yet, stability in shipments and prices will occur simultaneously only if market demand—in the schedule sense noted in the previous section—remains fixed during and over various shipping periods. If the market demand shifts from week to week, sometimes increasing and other times decreasing but neither in a systematic fashion, stable shipments will not result in stable prices. And widely irregular and fluctuating shipments may, but need not, result in stable prices.

Weekly volume prorates were authorized by the Orange Administrative Committee. In this respect, it is significant to realize that the prices for a given week in reality reflect volume prorates authorized for and shipments made during a period of about 2 to 2½ weeks earlier. Examination of the prorate record indicates the existence of a tendency for the committee to lag its prorate volumes, with the result that contractions and ex-

* For evidence on this point see pages 47-48.

pansions were accentuated. The committee seemed to eye prices received last week and currently as its barometer of market conditions, and prorate volumes were adjusted in accordance with past prices; in fact, however, those prorate volumes affected prices to be received two weeks later. Thus, a tendency prevailed for fluctuations in shipments to be wider than necessary, resulting in fluctuations in prices also wider than necessary.

Yet, it is important to recognize that among the pressures facing the committee are two which generally are inconsistent with each other. One pressure was "to ship," to dispose of the available supply, to sell one's fruit before it became unsalable or deteriorated. A second pressure was to operate so the market price would be raised, even if it meant a reduction in shipments would be necessary. Thus, bystanders watching the committee, or perhaps even some members of the committee itself, were not always aware that its operations reflected various influences and objectives some of which might have been inconsistent with others. Also, it appears that a clear distinction did not exist between operations which resulted in price raising, and those which resulted in increased total returns. Maybe too, the committee often was judged on the basis of its impact on price, and not enough on the basis of its impact on total returns and quantity-price fluctuations. Also, perhaps too often the committee was expected to produce results for which it was not established.

The committee was established in the years when fresh shipments heavily dominated the industry and when California contributed a relatively larger per cent of the supply than it does now. The committee was established to deal directly with fruit shipped fresh and not with fruit for processing. This does not mean it had no influence on the flow of fruit to processing, but such influence stemmed indirectly from its impact on influencing the flow to fresh market. Thus, fruit not

authorized to flow to fresh market under the prorate was inevitably destined for products if it was to be used at all. Many individuals looked to the committee as the determinant of returns received by the industry from both the fresh and processed markets. But in fact the committee's authority and responsibility for influencing returns was directly related only to its control over fresh shipments.

The above interpretation should not be viewed as expressing the thought that the committee made no errors or was uniformly successful in attaining sound objectives. But the interpretation does lean toward the view that the development of the products markets including frozen concentrated orange juice and the resulting or associated repercussions on the California orange industry cannot logically be charged against the Orange Administrative Committee.

Dissatisfaction on the part of a number of California growers, especially of Valencias, led to their petition to the Secretary of Agriculture asking for termination of the marketing order. The Secretary conducted a referendum among producers. After the voting in the referendum, the Department of Agriculture terminated the order. On March 6, 1952, the Department issued a press release which included the following statement.

"The U. S. Department of Agriculture announced today the termination, effective at 11:59 p.m., p.s.t., March 18, of Federal marketing order No. 66, as amended. This order, since October 26, 1942, has regulated by volume of shipment the handling of oranges grown in California and Arizona.

"Growers voting in a referendum conducted from January 7 through February 7, 1952, represented 70.07 percent, by number, and 80.24 percent, by volume, of all orange growers of record in California and Arizona. Of these voters, 60.19 percent, by number, and 58.93 percent by volume, favored continuing the order. By number, 39.81 percent, and by volume, 41.07 percent of the voters favored termination of the order.

"By volume of varieties of oranges the referendum results were: Valencias, 51.55 percent for continuance and 48.45 percent for termina-

tion; navels and other varieties, 73.10 percent for continuance and 26.90 percent for termination.

"Although a majority of the growers voting in the referendum favored continuance of the order, the Department said a careful study of the ballots cast by growers and briefs filed by handlers reveals wide differences of opinion concerning the program. Since support of the program, particularly on the part of the Valencia orange growers, does not appear to be substantial enough for effective operation, the program has been terminated."*

The termination order included the statement:

"Since continuation of the order was favored by 51.55 percent of the Valencia production voted and by 73.10 percent of the production of navel and miscellaneous varieties, consideration was given to the possibility of suspending the provisions of Order No. 66 to the extent of their applicability to the regulation of Valencia oranges. But this action was not deemed feasible in view of the evidence on the basis of which the order was made effective and of the inseparability of the varieties in many of the provisions of the order."†

There is a question whether the dissatisfaction among some of the growers was with the order itself or with how the order was operated. In either event, various segments of the California orange industries found themselves in an unfamiliar situation. Shippers found it necessary to operate from day to day and from week to week without prorates or regulations set by an industry committee. To many shippers this was a new experience, because the California fresh orange handlers had operated under some type of regulation since 1934.

Shortly after Order No. 66 was terminated, and even before the liquidation of the committee's assets was completed, some groups indicated strong interest in a new order. Various proposals were made, such as an order only for navels, and separate orders for navels and Valen-

cias. It became clear that the California orange industries, in view of changing economic relationships, faced new problems and potentials.

Problems and Potentials

This report, so far, has been concerned with what has happened in the orange industries to provide a basis for understanding what is the current situation and why. A review of past and current developments and an interpretation of them, however, also serves as a basis for pointing up some current and prospective problems and potentials facing the orange industries. These problems and potentials are general in the sense that they apply to the orange industries at large. Each individual or group must appraise his own situation in the light of the over-all situation.

It must be recognized, at the outset, that what may now appear to be some significant problems and potentials can drastically and suddenly change. A series of ruinous storms in Florida or a series of ruinous freezes in California can so affect the orange production in either of the states that present influences and tendencies would be submerged and lost under new ones. A sharp, sudden, and prolonged turn in international or military affairs can have repercussions which would make the earnings picture in citrus drastically different from what it now is or appears to be approaching. Such "outside" influences or potentials or their timing cannot be projected. But they have occurred in the past, and they may occur again; if they will, or when they will is not known. From the long view, however, the occurrence and impact of such outside influences can be recognized as potentials and only in a very general way; they cannot be incor-

* United States Department of Agriculture, Production and Marketing Administration. California-Arizona Orange Order Terminated, March 6, 1952. (2306, USDA 495-52)

† Order Terminating the Provisions of Order No. 66, as Amended, and Providing for Liquidation of Assets. [Title 7—Agriculture, Chap. IX—Production and Marketing Administration (Marketing Agreements and Orders) Part 966—Oranges Grown in California or in Arizona.]

porated into a planning framework in a precise or dependable manner.

With the currently available orange acreage, including recent plantings and nonbearing acreage especially in Florida, the level of national orange production can be expected to increase further—at least during the next five years or so. Thus, the pressure of orange supplies will continue to be a problem to growers, shippers, and processors. It is such supply pressure which induced the introduction of marketing orders for fresh orange shipments, the development of the canned single-strength orange juice, and later the development of the frozen concentrated orange juice. Those marketing devices and changes reflected attempts to dispose of the ever mounting orange supplies with profitable returns. And although the total demand for oranges and orange products has expanded, the supplies have continued to grow so fast that the supply pressure remains and even has increased.

From the view of California orange growers and shippers, especially of Valencias, the mounting supply pressure is not only in absolute terms or in terms of boxes per year. The redistribution over the year of the marketing of the Florida crop, with the substantial and increasing proportion put into frozen concentrate, has presented a new phase of competition from Florida. This problem, like the one of absolute increase in annual supplies, is not new. But it is now more intensified and reflects the loss of a good deal of the seasonal marketing advantage previously held by California Valencias. Florida has been able to expand its sales territory, through its frozen concentrate, to the Pacific Coast, thus selling in large volume in an area that was not economically accessible to Florida fresh shippers. These problems may be viewed as chronic ones in the sense that they will not disappear.

We have mentioned the problems of supply pressure reflecting the upward trend in national annual production, and the redistribution over the year of mar-

keting the Florida crop and expansion of its market area because of the growth in frozen concentrate. To this must be added the potential of orange imports into this country. In the neighboring country of Mexico, for example, production can expand substantially. Imports from Mexico so far have been sporadic and not over a wide area. Whether the supply pressure stemming from domestic production will be increased by the Mexican supplies depends in part on the interaction of two influences: the price level for oranges and orange products in this country, and the extent to which Mexican consumption and demand will expand to absorb their growing production. Presently the Mexican production of oranges is growing at a faster rate than its consumption.

It is reasonably clear that a significant problem facing California growers and shippers is the expanding production in other areas. This increased production and its market distribution over the year have been reflected in net earnings of California orange growers. The differential impacts on the earnings of California Valencia and navel growers reverse the historical position of those two varieties in the state. In the two decades preceding World War II, new orange plantings in California were primarily of Valencia varieties. The competitive advantage resulting from their marketing when Florida fresh supplies were at a seasonal low was reflected in their earnings; and thus their planting was encouraged relatively more than that of navels. That situation now tends to be reversed. Generally, navels no longer are considered at a disadvantage relative to Valencias; and California planting trends or pulling trends may so reflect. This suggests the potential that navels will tend to contribute a relatively larger proportion of the state's orange crop, and Valencias a smaller proportion.

But while noting the production problems and potentials in California, and the growing supply pressure at the na-

tional level, it is pertinent to clarify that the growing pressure of domestic supplies is from the rapidly expanding production in Florida. The favorable returns to Florida growers in most of the postwar years, stemming from the competition among Florida fresh shippers and processors for orange supplies, induced even greater plantings than would have otherwise occurred in Florida. Such Florida plantings have begun to produce fruit and in the coming decade will give higher yields and increased production. This increased supply pressure can be expected to develop a situation where returns to Florida growers, as well as to California growers, will be no more favorable than when frozen concentrate first came into the picture and was viewed as the savior. The frozen-concentrate outlet created a boom for Florida growers for several years; but the problem of supply pressure has begun to reappear and may be expected to be facing the Florida grower as well as the California grower. Frozen concentrate has not eliminated the problem of pressure of supplies from an increasing production.

The development of the frozen-concentrate market and the continuation of increased production and supplies brings into sharp focus the role of demand for oranges and orange products. In order to counteract the price-depressing effects of increased supplies of oranges and orange products, their demands must increase if low returns to producers are to be avoided; this refers to producers in other states as well as in California.

Advertising and related devices have long been used in the promotion of the sale and consumption of fresh oranges. The development of frozen concentrate brought further advertising promotion. The brunt of the advertising for fresh oranges was borne financially by large grower marketing co-operatives and state commissions; the advertising for frozen concentrate so far has been primarily financed by and for private packers of

frozen concentrate. They have undertaken aggressive merchandising and advertising campaigns, designed to expand their market.

This reference to advertising expenditure is made to indicate how the competitive nature of the industry has quickly undergone a change; not that large-scale advertising has been undertaken—that is an old story in orange marketing. Now, individual firms have advertising budgets exceeding the sums which the industry as a whole spent only several years ago. Aggressive sales competition is a significant feature of the orange product business, and each packer feels he must expand his advertising if he is to expand his sales.

Along with nonprice competition such as advertising, price competition has also been aggressive in the frozen concentrate business. Frozen concentrate has been widely used in introductory offers, "loss leaders" and week-end specials at the retail level. In addition, there has been a persistent downward trend in the retail price. Sales aggressiveness with competition of both the nonprice and price types, along with the consumer acceptability of the product, account in large part for the marked growth in the use of frozen concentrate.

The competition among the packers and distributors of frozen concentrate has had multiple effects. Not only have individual packers attempted to attract frozen concentrate business away from other packers but also to attract consumers who habitually use fresh oranges. Thus, the sales aggressiveness of the frozen concentrate distributors has had repercussions on the market for fresh oranges. And the distributors of fresh oranges have before them an intensified, if not new, problem. They are in a situation where increased sales aggressiveness, pricewise as well as nonprice, is called for if the fresh markets are not to become a less important segment of the orange industry.

The growth in orange products reflects a change in the nature of the orange industries. They have become less "agricultural," and more "industrial." The consuming public is being supplied with products manufactured from oranges; and as many other manufactured products, their prices display smaller short-run fluctuations than do the prices of fresh oranges. This is evident from the behavior of the retail prices of fresh oranges, frozen concentrate, and canned single-strength orange juice (see figure 23).

The relative short-run rigidity in the prices of orange products reflects a pricing mechanism where fluctuations in storable inventories rather than fluctuations in prices act as the "shock absorber" of interactions between short-run market supply and demand. Fresh oranges must be sold within a short time at the best price obtainable, even if it is a "low" price, so they can be disposed of before deterioration; hence, "flexible" prices. Frozen concentrate, as well as canned single-strength orange juice, need not be sold as quickly to prevent deterioration; the sale may be deferred and the supply carried in inventory for some time; hence, "rigid" prices.

At the beginning of frozen concentrated orange juice, many in the trade were of the opinion that the storability of the product—permitting flexibility in building and depleting inventories thereby regulating the flow to consumer outlets—would solve a major problem. No longer, was it thought, would it be necessary to make forced or sacrifice sales as in fresh fruit. From the view of supply control, it was thought orange marketing had reached a point where "orderly" marketing could be attained to the advantage of growers, distributors, and consumers.

But, in fact, the situation has not worked that way. Storability of the product and flexibility possible in inventories have raised new problems. With the

growing pressure of supplies, inventories of frozen concentrate could build up quickly. In midwinter 1951-52 the industry was saddled with frozen concentrate inventories which depressed the price for fresh oranges for concentrate manufacture and also tended to depress the price of oranges for fresh shipping. Thus, the problem of intraseason and interseason fluctuations in inventories of orange products assumed a position of importance greater than in the pre-World War II years when fresh shipments dominated the orange industries. The accumulation of inventories solves marketing price problems much less than it defers them; and usually the accumulation reaches a point where there is a scarcity of sufficient economic strength to continue to accumulate and hold the inventory. At some point price-depressing sales of inventory occur and the market price declines, affecting the fresh as well as the processed markets. Inventory management calls for judicious market appraisal and foresight, and inventory accumulation creates problems as well as temporarily alleviating other problems.

With inventory problems arising in the orange products markets and the pressure of supplies from acreage already planted, the industry groups begin to consider marketing schemes to alleviate contemporary problems. These schemes take on various forms. A very substantial and victorious minority in California favored the dropping of the fresh shipping volume prorate, other groups in the state desired its continuation (see page 61); some groups in Florida favor the dropping of the fresh shipment grade and size prorate, other groups in that state desire its continuation; some groups suggest consideration of a marketing order for California orange products as has been introduced for lemon products. Variations are considered, such as having marketing order regulation for California navels but not for California Valencias. Some private packers in Flor-

ida have developed special supply and price arrangements with growers. Shipping groups in Florida have attempted to establish and maintain "price floors" for their fruit, so far without success.

These programs and schemes are all phases of an attempt to get around the price and income effects resulting from supplies growing at a faster rate than demand. Such programs and schemes—when used moderately and without expecting too much—can contribute to industry betterment in the sense that they may be co-ordinated with adjustments in basic supply and demand. The programs and schemes by themselves, and in the short run, may give the appearance of solving certain problems. But in the long run the basic supply and demand influences dominate the outcome. The situation was sharply put a decade and a half ago in the following words which are still to the point:

"...marketing control schemes which have for their sole purpose the regulation of the flow of shipments to market during the season and which do not involve actual limitation of the total supply marketed are likely to prove beneficial to growers both in the short run and in the long run. Such regulation is a device which can be used continuously with reasonable safety and is particularly applicable to fresh fruits and vegetables.

"Marketing-control schemes which are designed to limit the total supply marketed for the season as a whole are in quite a different category. This type of control is essentially a palliative and should be treated as such. It should be used only in acute emergency situations; that is, when prices and returns to growers would otherwise be at distressingly low levels. Its use should be confined to raising re-

turns to producers up to the returns obtained from alternative crops. To go beyond that is to court disaster."[†]

Under present conditions the interdependence among the markets for fresh oranges and orange products is such that operations in one affect the returns in the other. Hence, there is the important problem of allocating the crop among the alternative outlets. If the interests of all growers were merged, the ideal allocation would be consistent with obtaining the largest net profit from the entire crop. But all growers do not have the same interests. Navel growers, for example, have less direct interest in juice processing than do Valencia growers. Thus, a pressing problem is not so much whether the fresh orange shipping prorates contribute to the welfare of the orange industry, but whether a different type of program can contribute more than the California-Arizona order recently terminated. A real need is to recognize the divergent group interests in the light of changing economic conditions. And those changing economic conditions now call for more than being concerned only—or even primarily—with intraseasonal shipments of fresh oranges. Superimposed upon that concern—aside from navels which are in a special category—is the concern of arriving at decisions as to how much of the crop is to be shipped fresh, how much is to be processed, and in what forms.* The orange industries of California—and Florida too—now face the problem whether such decisions are to reflect organized group thinking and

[†] H. R. Wellman, "Controlled Marketing with Special Reference to California Fruits and Vegetables." Univ. of California, College of Agriculture, Agr. Exp. Sta. November 16, 1938. pp. 9, 10.

* An example of the type of analysis referred to is presented for lemons and lemon products in: Sidney Hoos and R. E. Seltzer, *Lemons and Lemon Products, Changing Economic Relationships*, University of California, College of Agriculture, Exp. Sta. Bulletin 729, pages 46-68. Although comparable analyses for oranges and orange products are being developed, they are not now at the stage where they are adequately acceptable from the combined views of economics, marketing, and statistics. When that stage is reached, there will be available some tools for the orange industries in their consideration of questions as "what proportion of the orange crop should be shipped fresh and what proportion processed; and of the latter, how much into each of the major processed products?" Questions as those are indicative of a number of production-marketing problems which are becoming of more and more significance to the orange industries.

interests under the jurisdiction of appropriate federal and state authorities, or, whether the outcome is to reflect the independent and unco-ordinated interests and actions of individual growers, shippers, and processors.

But in either event and with the increasing relative importance of orange products, the structure of the California orange industries is undergoing change. In the Valencia producing areas where increasing amounts of the crop are being sent to products, the location, size, and operations of fresh-shipment packing houses call for careful scrutiny. Acreage changes and shifts in production areas suggest that elimination of some packing houses, or their consolidation with other houses, can reduce costs and at the same time bring the productive services of the industry in line with current developments.

Another potential facing the industry, which may warrant further attention, is the development and importation of new or little-known varieties and/or stock scion combinations. As science and technology have made possible strides in the manufacture of improved orange products, so can horticulture and plant genetics develop new varieties among which some would be especially adapted for fresh shipment and others would be especially adapted for processing. The fact that orange products have grown in popularity and production in the past several years does not, by itself, mean that the fresh shipping business is doomed to an ever decreasing position. With an expanding population, with improved fresh fruit to attract consumers, and with prices not out of line with consumer judgments, there is the potential of a large and growing market for fresh oranges.

The recent boom in frozen concentrate and California's position in it has led some to believe that the state is on the way out of orange production because it could not compete with Florida. Chang-

ing economic relationships, in oranges as in other industries and markets, reflect and cause shifts in production. But competitive orange production in Florida, by itself, cannot account for production changes in California. The production alternatives in California are equally important.

A large part of the California orange acreage, shifted to housing development sites in recent years, was so shifted not because of competition from Florida oranges, but simply because the alternative returns were higher. Competitive pressure from other orange-producing areas does, of course, influence the decision of resource owners as to whether they will continue orange production or shift to other lines. But the expected returns from those other lines, compared with the returns from oranges, also influence the decision of the resource owners. When or where California orange acreage is reduced, it is because the earnings from orange production on that land are less than expected earnings from that same land used for other purposes; and earnings per box or acre in California compared with Florida are not fully meaningful as an explanation of orange acreage changes in either state. The matter may be put simply by saying that competition from Florida influences the prices California growers receive for their fruit; those prices, compared with the costs of California growers, influence their earnings; and those earnings, compared with what the land and resource owners expect they could earn if the land were used for other purposes, influence the decision as to whether the land continues in orange production or is shifted to some other use.

This chain of influences sharply summarizes why the California orange industries are now much concerned with price influences such as prorate administration and the competitive supplies of orange products, with cost-reduction potentials such as the reorganization and consolida-

tion of packing houses, and with earnings from orange acreage. Those earnings and how they compare with expected

earnings from alternative crops or uses of the land determine the course of the California orange industries.

The tables and figures appearing in this bulletin are summaries of more detailed tables, which are published in a separate Statistical Supplement in mimeographed form and which give the sources in detail. This supplement can be obtained by writing to the Giannini Foundation of Agricultural Economics, University of California, Berkeley 4, California.